Going Green at the Point of Sale

Application of Digital Technologies and Message Framing to Promote Sustainable Consumption

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More sustainable food consumption and production could make a significant contribution to reducing greenhouse gas emissions and protecting natural resources. Nevertheless, the market shares of "green" products are still low. This cumulative dissertation aims to increase green consumption by exploring different marketing communication strategies. Article I shows that Point-of-Sale technologies such as digital signage and augmented reality can draw consumers' attention to sustainable products and increase their sales. Article II focuses on the formulation of advertisement messages and suggests that their credibility is a central driver for buying intentions. Since specifically formulated environmental benefits are perceived as particularly credible, their use is the most promising. The third article proves the effectiveness of a newly developed form of green advertisements aiming at increasing both the perceived customer orientation and environmental responsibility of a company. Article IV tests an information app to educate consumers about the sustainability of products and shows that a simple and credible „sustainability index" is most effective in shaping behavior.

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Please consult the original publication of the article.

List of Abbreviations

ANOVA *Analysis of Variance*

AR *Augmented Reality*

CER *Company's Environmental Responsibility*

CL *Construal Level / Number of customers buying local milk packages (Article 1, results section)*

CLT *Construal Level Theory*

CO *Number of customer buying organic milk packages(Article I) / Customer Orientation (Article III)*

DS *Digital Signage*

H Hypothesis

M *Mean*

PL *Number of local milk packages bought*

PO *Number of orcanic milk packages bought*

POS *Point of Sale*

SD Standard Deviation

SME *Small and Medium Enterprise*

S-O-R model *Stimulus-Organism-Response Model*

A. Research Context and Theoretical Framework of this Thesis

1. The Relevance of Sustainable Consumption

> *"The greatest threat to our planet is the belief that someone else will save it."*
>
> Robert Swan (Polar researcher and environmentalist)

Our society consumes far more and faster than the natural resources of our earth allow. The challenges of our time – global warming, air pollution and scarcity of resources – have primarily been caused by this consumption behavior, and can only be reduced through joint efforts (Shwom and Lorenzen, 2012). The German Federal Government has, therefore, set the goal of reducing climate-damaging greenhouse gas emissions by at least 55% until 2030 and 80 to 95% until 2050 below the level of 1990 (German Federal Government, 2018). To achieve this goal, particular attention has to be paid to private consumption, as already suggested by the 12th sustainable development goal of the United Nations: *Responsible Consumption and Production* (United Nations, 2015).

Consumption behavior is responsible for around 60% of global CO_2 emissions (Ivanova *et al.*, 2016). According to the FAO Statistical Yearbook (2018), agriculture accounts with around ¼ of all global greenhouse gas emissions for a lion's share of it. In Germany, private nutrition causes around 1.75 tons of climate-relevant emissions per person and year (German Federal Environmental Agency, 2016) – an amount that could be substantially reduced by switching to more sustainable production patterns. If European agriculture was transformed to organic production, this would probably lead to a reduction of climate-relevant emissions by up to 35% (Lindendthal and Markut, 2010; Müller *et al.*, 2016). Even following a more conservative calculation assuming an average CO_2 saving of 5% for organic food compared to conventionally produced food, an increase in the market share of organic food to 18% could avoid at least 320,000 tons of climate-relevant emissions in Germany every year.

Keeping these numbers in mind, it seems highly important to achieve the respective goals of the government of cultivating at least 20% of the agricultural land in Germany organically by 2030 and increasing the market share of food products with governmental eco-labels from slightly over 8% at the moment to 34% by 2030 (German Federal Environmental Agency, 2019). Producers and consumers share the responsibility for achieving these goals – because only if sustainable food products are sold, their production is attractive for companies.

2. Scope of this Dissertation Project: Tackling the Attitude-Behavior-Gap

Many consumers seem to be aware of this responsibility and express growing interest in environmental issues and environmentally sustainable products. In a representative survey by the German Federal Environment Agency (2020), 68% of the surveyed participants stated that environmental and climate protection is a very important challenge. However, buying behavior often deviates strongly from these statements. At the point of sale, consumers do not act according to their environmental norms but purchase mostly conventional products. Therefore, sustainable products remain niche products (Carrington *et al.*, 2014; Vermeir and Verbeke, 2006; Young *et al.*, 2009). Although attitudes towards sustainability were proven to be a main driver of sustainable behavior or at least behavioral intentions (e.g. Hines *et al.*, 1987; Bamberg and Möser, 2007), meta-analyses also show that their explanatory power is only moderate (Hines *et al.*, 1987). This so-called "attitude-behavior-gap" (Vermeir and Verbeke, 2006) or "green paradoxon" (Royne *et al.*, 2012) is not only a substantial obstacle for more sustainable agriculture and manufacturing (Martenson, 2018), it also causes sales losses for retailers who could otherwise benefit from the higher margins of sustainable products (Pelsmacker *et al.*, 2005). So, purchasing barriers and further predictors for sustainable consumption must be identified to design effective measures to promote "green" products.

This is the goal of this cumulative dissertation project. In a total of four articles, different communication strategies based on literature concerning sustainable consumption, consumer psychology, and point of sale technology are developed and tested. All explored communication strategies might be applied by manufacturers or retailers of sustainable products to promote these goods, which might hopefully contribute to a more sustainable economy. However, before the individual strategies and articles are highlighted, the research context and theoretical framework of this work will be briefly presented.

3. Purpose and Positioning in the Research Field of Sustainability Marketing

This thesis is theoretically grounded in the research field of "sustainability marketing", which has been addressing questions of sustainable production and consumption for over 30 years (Meffert and Kirchgeorg, 1993; Meffert *et al.*, 2015). Sustainability marketing as a decision-oriented management approach means avoiding ecological and social problems in the planning, coordination, implementation, and control of all transaction activities of a company in order to permanently satisfy the needs of current and potential customers. By ensuring social legitimacy, a company can reach a competitive advantage and thereby also ensure economic sustainability (see Meffert *et al.*, 2015). In this respect, it achieves an immediate personal

benefit (profit) by simultaneously creating a collective benefit – namely, a more sustainable future; thus, it creates value for the whole society. The inner conviction of a company or a leader to achieve this can be described with reference to the Leipzig Leadership Model as their "purpose" (see Kirchgeorg *et al.*, 2017). It forms the center of all managerial actions, which must then be implemented responsibly, entrepreneurially, and efficiently in order to contribute to the desired goal (refer to Kirchgeorg *et al.*, 2017 for an elaborated discussion). If a company wanted to verbalize this purpose, this could be done suitably via the UN definition of "sustainability" (United Nations, 1987, p. 37): "[meeting] the needs of the present without compromising the ability of future generations to meet their own needs." This definition incorporates not only ecological sustainability, but also social and economic sustainability (three-pillar approach of sustainability; see Belz, 2004; Kirchgeorg, 2004) and thereby serves perfectly as a claim of action for producers and retailers of sustainable products.

Following this argumentation, the present thesis also grounds on the three-pillar approach of sustainability. While the products featured within the studies are mainly environmentally friendly (i.e. ecological sustainability), they contribute to a more sustainable future (collective benefit, i.e. social sustainability) and thereby build a potential competitive advantage over conventional alternatives (i.e. economic sustainability) for producers and retailers. So if the following articles refer to "sustainable products", this term describes ecologically sustainable products, i.e. environmentally friendly products that protect the natural environment and its resources while burdening it as little as possible with waste from production and consumption (see also Günther, 2018).

This thesis aims to provide valuable insights to reach the described purpose-driven goal of establishing sustainable products on the market. If companies fail to sell them due to customers' intention-behavior-gap, effective communication measures are required to minimize purchase barriers and to encourage consumers to buy sustainable products (instead of more environmentally harmful conventional products). Within this dissertation project, I investigated different corresponding measures, which can all be classified as part of the "communication" aspect of sustainability marketing (see e.g. Meffert, 1998; Kumar *et al.*, 2012). Most research in this area is aimed at optimizing "green advertisements", i.e. advertisement messages for ecologically sustainable products as they have been defined before (see e.g. Alniacik and Yilmaz, 2012). This strand of research is continued (see Articles I and II), but Articles III and IV also aim to develop and test completely new communication measures to promote green consumption.

4. Behavior-Theoretical Research Framework

The four articles presented within this cumulative thesis feature different communication strategies, but all have conceptual similarities and can thus be integrated into a common framework. First, all articles investigate strategies that can be applied directly at the point of sale (POS), i.e. in grocery stores (Articles I and IV) or also in an online shop (Articles II and III). This focus on the POS is due to the fact that 70% of all concrete purchase decisions are made there (Hunstiger, 2011)[1]. So, strategies that intervene at the moment of purchase seem to be particularly promising. Second, all four articles focus on the psychological processes in consumers' minds leading to the purchase or non-purchase of sustainable products. Thereby, this work follows a neo-behavioristic approach to understand consumers better and, thus, be able to influence them. In contrast to the behavioristic approach, which considers the consumers' mind as a "black box" and only integrates observable and measurable variables (Stimulus-Response-Models), this approach examines the relationship between the stimulus, i.e. the communication measure, and the response, i.e. the buying behavior (Stimulus-Organism-Response; see Meffert *et al.*, 2015). This distinction between observable variables (e.g. buying behavior) and intervening variables (e.g. credibility of the advertisement, see Article II) is essential to be able to transfer the effects found into other contexts and to enable their adaptation in practice. Therefore, this dissertation also follows related studies on acceptance barriers of sustainable products (e.g. Buerke, 2016; Rudolph, 2019) by applying a "real behavior model" (Figure 1).

STIMULUS	Attention filter	ORGANISM		RESPONSE	
Article I-III Advertisement		*Article I* „Matching" Construal Levels → Process Fluency		*Article I* Green Purchasing Behavior	
Article IV Information App		*Article II* Credibility of Advertisement		*Article II-IV* Green Purchasing Intentions	
	Article I	*Article III* Empowerment → Corporate Evaluations			
		Article IV Information Load → Decision Certainty			

Context: Point of Sale

Figure 1: Stimulus-Organism-Response framework of this cumulative thesis

To stimulate sustainable consumption, this thesis examines in particular various advertisement strategies that are intended to trigger processes which, in turn, lead to greener purchasing decisions. In Article I, the classic S-O-R model is further expanded by another

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[1] Citing the GfK study "Store Effects" (2011) which is no longer available

component: an attention filter. Consumers often ignore stimuli automatically when they think they contain persuasive information (Owens *et al.*, 2011). This is because human brain capacity is limited (see Marois and Ivanoff, 2005), so we cannot deeply process all stimuli in the (shopping) environment. However, if no attention is gained, advertisement stimuli won't be able to influence consumer behavior, irrespective of their design. To overcome this attention filter, we explored the potential of in-store technology in **Article I** (see Figure 1).

All four articles investigate different variables in the organism, as indicated in Figure 1, and thereby they all have a consumer-psychology focus, but there are also further similarities: The first three articles, as will become clear in the next chapter, deal with the framing of advertising messages for sustainable food products. Article IV also focuses on the design of sustainability information for food products; however, as in Article I, modern technology is used here to inform consumers about the sustainability of a wider product range. The articles presented in this dissertation thus combine POS technology research with consumer psychology in order to obtain innovative insights into the promotion of sustainable consumption at the POS, contributing to closing the attitude-behavior gap.

5. Overview over and Relation between the Articles

This thesis contains four empirical research articles dealing with different communication strategies to increase sustainable consumption at the point of sale. Although all articles examine different approaches and can be understood as stand-alone articles bundled within this cumulative dissertation, they partly build on each other. This section briefly describes these connections and gives a first overview of the four articles.

5.1 Article I: Message Framing and POS Technology

The first article proposes a two-stage model of increasing sustainable consumption at the point of sale by (1) gaining customers' attention for green advertisements via innovative in-store technologies and (2) using this attention by optimally framed messages fitting the existing cognitions consumers associate with different sustainable products. The model is tested within a two-week field experiment at a food retailer. We presented advertisements for different sustainable products (organic vs. local milk) via non-interactive Digital Signage (DS) screens or via an interactive Augmented Reality (AR) application. The presented messages were either framed at a high or low construal level (according to the Construal Level Theory, see section B 2.2, Liberman *et al.*, 2007) since we assumed that this framing strategy would interact with consumers' associations with different sustainability categories. We found that the AR application attracts significantly more attention than DS, but both technologies were able to

increase sales of sustainable products. Results indicate that using messages with a concrete, low-level construal framing is more effective for organic products, while no significant differences could be detected for locally produced goods.

This finding contradicted our initial assumptions. Former studies had shown that "sustainability" as a concept is linked to abstract associations. We had therefore assumed that organic products are also associated with rather abstract cognitions, so abstractly framed messages should be more successful in triggering green consumption. We explained the found success of low-construal advertisements, i.e. concretely framed messages, with the fact that the personal advantages of organic products are probably in the foreground when buying them (e.g. health, taste). These personal benefits are mapped at a low construal level (see section B 5.2). However, this explanation was only based on related research, not on empirical data. So, we had to investigate the psychological process mediating between construal level message framing and purchase intentions further to see whether it is indeed the benefit association that causes the advantage of a low construal level. The connection of the benefit type and construal level framing proposed by former literature might also be only apparently in nature and caused by a so far unknown third variable. Therefore, in a second study, we examined both variables separately, taking a closer look at message credibility as a potential linking variable.

5.2 Article II: Benefit Type vs. Message Framing

Sustainability marketing researchers have had a long-standing discussion about whether self- or other benefit arguments are better suited to boost the sales of sustainable products. As already argued, the argument type could also be related to the optimal construal level framing of the message (see section C 2.). However, benefit type and message framing have so far hardly been investigated in combination. Therefore, we explored within an experimental study (representative German sample, n = 297) whether self-benefit appeals (e.g. health advantages) vs. other-benefit appeals (e.g. environmental benefits) and abstract message framing vs. concrete message framing are more effective in generating green purchase intentions. As it turned out, both factors do not interact as it was assumed in Article I, but rather independently influence customers' purchase intention for sustainable products. Nevertheless, they both work decisively via the same mediator – namely the *credibility* of the advertising message. Results indicate that, based on a higher salience of environmental benefit arguments in consumers' minds, other-benefits are more effective in increasing green purchase intentions than self-benefits. Besides, concrete, low construal messages are perceived as more credible than abstractly framed messages, but do not generally increase purchase intentions. Our results

therefore suggest the use of environmental benefit arguments combined with concrete message framing in advertisement messages for organic food products.

5.3 Article III: Green Consumer Empowerment

Articles I and II investigate classic "green appeals" following a long tradition in sustainability marketing. These advertisements focus on consumers and their potential personal contribution to the environment through more sustainable purchasing behavior. However, some studies show that such green appeals can also have a negative impact on purchasing decisions – for example, if consumers think that companies use all their resources to make a product sustainable instead of ensuring its quality (see section D 1.). The companies appear to be less customer-oriented, which has negative consequences for customers' buying intentions. In Article III, we therefore develop and test a new form of advertisements for sustainable products that focus on customer demand as the major driver of companies' decisions, such as the adoption of eco-friendly manufacturing. These "empowerment ads" simultaneously emphasize the company's customer focus and its environmental responsibility; they empower consumers without burdening them with the entire responsibility for the environment. We compare these ads with classical green appeals and find a significantly improved perception of the company's customer orientation and increased purchase intentions for the green empowerment ad (Study 1, n = 291). Corporate environmental responsibility is also improved, although at a comparable level to green appeals. We further examine ad effectiveness depending on companies' resources (Study 2, n = 457), and find that a green empowerment ad is more effective for large, high-resource companies than for small companies – probably because consumers do not think small companies have the resources to produce sustainably. Nevertheless, empowerment ads are still also the best advertisement strategy for small companies if they aim to increase purchase intentions.

5.4 Article VI: Development and Test of Sustainable Information App

The first three articles examine persuasive advertisement messages to increase sustainable consumption. Nevertheless, only one specific product at the same time can be advertised with green ads – however, we cannot place sophisticated advertisements for *all* sustainable products at the POS. As it became clear from Article I, this would completely drain the cognitive resources of consumers. Furthermore, there might be more than one "sustainable" product in a product category (e.g. organic and local milk), so how should consumers assess which product is the most sustainable one? For those reasons, green advertisements may not be the only necessary instrument for promoting sustainable consumption at the POS, especially for retailers

who aim to shape the whole consumption behavior of their customers in a "greener" direction. Therefore, we apply a slightly different, more educational approach in the last article.

We conducted three focus groups á seven participants who helped us to identify purchase barriers for sustainable products. These barriers were primarily of an informative nature: customers have no trust in sustainability labels because they do not know enough about them, and they cannot judge which product in a category is actually the most sustainable one. To tackle these barriers, we decided to follow a practice-oriented approach that again applies modern technologies. We developed a sustainability information app that shows consumers the relative sustainability of all products in a category (e.g. all apple juices) using a single index (the "eco score"). In addition, the app enables consumers to inform themselves step-wise about sustainability labels and gain other background information about sustainability. However, a test of a beta version of the app compared to a simpler product ranking without further background information (representative German consumer sample, n = 363) showed that consumers do not want as much information at all. Too much sustainability information makes them uncertain in their decision, especially when the information contradicts what they think to know about sustainability (e.g. that local production is always sustainable). So, less seems to be more here, but only if the simple decision-making aid (e.g. product ranking) is also highly credible. An overview of the four articles and the author's contributions to it can be found in Table 1.

Table 1: Publication status of articles within this dissertation and author's contribution

Title	Author's Contribution	Publication status
Article I: Increasing Sustainable Consumption: Message Framing and In-Store Technology Co-Author: Dr. Anja Weber	Main authorship Main responsibility for the theoretical development, study design, literature review, implementation of the field study, data analysis and writing of the paper	Reviewed by and Published in *International Journal of Retail & Distribution Management (2020; Vol. 48, No. 8, pp. 803-824)* DOI: *https://doi.org/10.1108/IJRDM-02-2019-0044*
Article II: Can you believe it? The effects of benefit type versus construal level on advertisement credibility and purchase intention for organic food Co-Authors: Dr. Anja Weber	Main authorship Main responsibility for the theoretical development, study design, literature review, implementation of the studies and writing of the paper *except* the method and results section of the main study	Reviewed by and Published in *Journal of Cleaner Production (2020; Vol. 257, Article 120543)* DOI: *https://doi.org/10.1016/j.jclepro.2020.120543*
Article III: "Let me decide how green you are!" – The effects of green consumer empowerment on corporate evaluations and purchase intention in advertising Co-Authors: Xisi Yang, Dr. Anja Weber	Third author Shared responsibility for the development of the theoretical model, selection of methods as well as the structure of the paper	Under Review at *Review of Managerial Science* DOI: *No DOI available yet*
Article IV: Sustainability Apps – the Key to Promoting Sustainable Shopping? Co-Authors: Dr. Anja Weber, Prof. Dr. Manfred Kirchgeorg	Main authorship Main responsibility for the theoretical development, study design, literature review, implementation of the studies and writing of the paper *except* the method and results section of the main study	Reviewed by and Published in *Marketing Review St. Gallen (2020; Vol. 257, Article 120543)* DOI: *No DOI available*

In parts B to E of this thesis, the full articles or corresponding references to their journal publication can be found (Article III is still under review and might be changed during the ongoing publication process). In section F, an overarching summary and a discussion of all four articles is provided, also shedding light on limitations and potential future research topics in line with the presented approaches. Summary and conclusion are followed by the declaration of Co-Authors providing further insights on how the work on the different articles was distributed.

B. Article I: Increasing Sustainable Consumption: Message Framing and In-Store Technology

Authors: Anna-Katharina Jäger, Dr. Anja Weber

Purpose – This study investigates the potential of two different digital in-store technologies and advertisement message framings according to the construal level theory for increasing sustainable consumption. This paper aims to provide managerial implications for the promotion of sustainable products at the point of sale as well as to theoretically contribute by integrating the literature streams of perceptual research, point-of-sale marketing, and construal level theory.

Design/methodology/approach – We tested our hypotheses in a two-week field experiment with a 2 (product label: organic vs. local) x 2 (message framing: high vs. low construal level) x 2 (presentation technology: Digital Signage vs. Augmented Reality) between-subjects factorial design. The study was conducted in two grocery stores of different sizes using milk as a test product. Purchase data, as well as attention data gathered by facial recognition software, were analyzed.

Findings – Even though the magic mirror augmented reality application attracted significantly more attention, it did not significantly boost sales compared to the digital signage technology. In the larger store, the sales of the advertised sustainable products were significantly higher in both technology conditions than in the control condition without advertisement. If consumers pay enough attention to the promotion, results indicate that using messages with a concrete low-level construal are more useful for organic goods.

Originality/value – This study is the first investigating a combination of in-store technology and construal level message framing for the promotion of sustainable products. It extends the retailing literature by proposing a two-step approach on how to use in-store technology effectively: (1) gaining attention, (2) matching messages to existing cognitions.

1. Introduction

Currently, humanity is facing greater environmental challenges than ever before, and most of them are man-made. For example, private household consumption patterns are estimated to be responsible for up to 60% of the world's greenhouse gas emissions (Ivanova *et al.*, 2016). Above others, food production is accountable for a lion's share of these emissions (Scialabba and Müller-Lindenlauf, 2010). Shifting consumer choice towards more sustainable products could therefore help to substantially mitigate climate change and assure a more sustainable economy (Vandenbergh *et al.*, 2011). However, sustainable products remain niche products with market shares below ten per cent (Carrington *et al.*, 2014; Vermeir and Verbeke, 2006; Young *et al.*, 2009). This also causes sales losses for retailers who could benefit from the significantly higher margins of sustainable products (Pelsmacker *et al.*, 2005). Therefore, promoting sustainable consumption is highly important for both environmentalists and the retail industry.

While it may seem easiest to encourage sustainable consumption through short-term price promotions, in the long run, this is no viable strategy to promote a greener economy. Such promotions may cause sales peaks but no long-term behavioural changes among consumers (Pauwels *et al.*, 2002) or even negative effects on purchase intentions due to consumers' association of price with quality (Ngobo, 2011). Rather, it must be the goal of sustainability marketing to persuade consumers and engage them in more sustainable behaviour. Retailers and researchers have put much emphasis on examining whether advertisement messages at the point of sale (POS) can activate environmentally friendly values and attitudes of consumers and thereby lead to more sustainable purchasing decisions (e.g. Cho *et al.*, 2018; Frank and Brock, 2018). Nevertheless, the hoped-for success often failed to materialize (Andorfer and Liebe, 2015) or can even be negative for some product categories (Daunfeldt and Rudholm, 2014). Currently, retail managers and researchers therefore turn to new digital in-store technologies as a new opportunity to involve consumers (see e.g. Dennis *et al.*, 2012; Grewal *et al.*, 2017). Technological solutions are becoming more sophisticated and diverse while the necessary hardware gets cheaper (Hagberg *et al.*, 2016; Javornik, 2016b), but their impact on consumers has hardly been scientifically investigated so far. In particular, their potential to increase sustainable consumption was mainly neglected. According to first studies, in-store technologies such as augmented reality displays might be able to address consumers both emotionally and intellectually (Dennis *et al.*, 2014; Javornik, 2016a), so research should more deeply investigate the technology's potential to promote sustainable products.

Perception research shows that stimuli first have to pass a selective attention filter before they might be processed (Broadbent, 1958). We argue that in-store technologies may be able to pass this first filter by providing novel, interactive and non-static stimuli that increase customers' arousal and improve their shopping experience (Helmefalk and Berndt, 2018; Lecointre-Erickson *et al.*, 2018). In a second step, the information provided via the technologies has to emotionally and intellectually engage the customer; otherwise it may only have a limited impact on behaviour (Eagly and Chaiken, 1993; Hagberg *et al.*, 2016; Willems *et al.*, 2017). Previous research suggests that consumers' attitudes toward an object become more positive when the presented information is easy to process and its meaning is easy to grasp (Lee and Labroo, 2004). To design such information, differentiated insights on how sustainable products are understood and processed by consumers are needed, also taking into account potential differences between sustainability attributes such as organic vs. locally produced goods. The Construal Level Theory of Psychological Distance (CLT; Trope and Liberman, 2010; Trope *et al.*, 2007) has already been applied in this context to explain why some advertisements for sustainable products lead to more positive reactions amongst consumers than others (e.g. Reczek *et al.*, 2018). Nevertheless, so far only purchase intentions but no real consumer behaviours were investigated and no digital in-store technologies have been used (Cho *et al.*, 2018; Reczek *et al.*, 2018). Furthermore, previous studies did not distinguish between different types of sustainable food products. We aim to close these gaps by reasoning why different message framings may be more or less effective in promoting sales for organic vs. locally produced food due to their fit to existing cognitive structures.

The results of a field experiment studying actual consumer data presented in this paper open up insights for marketers and retailers on how to promote sustainable products at the POS. To do so, research on POS marketing applying new technologies and consumer psychology research based on the CLT are integrated and contribute to a better understanding of purchase decisions. We analyze and compare the effects of two different message framings presented via two in-store technologies, namely digital signage and a magic mirror augmented reality application, on two different outcome variables – the level of consumers' attention (attention filter) and real purchase data (activation of consumers). Thereby, this study not only contributes to sustainability marketing research but also to literature on POS marketing by being one of the first empirical papers investigating the effectivity of screen-based in-store technologies. This paper is organized into five sections: First, we describe the theoretical background and derive hypotheses from existing literature. Then, the methodology as well as the results of the field-

experiment are explained. In the end, the scientific and managerial implications of the results are discussed before addressing limitations and future research.

2. Theoretical Background and Hypotheses

2.1 Digital In-Store Technologies: Digital Signage and Augmented Reality

Innovative in-store technologies such as digital signages or interactive augmented reality applications open up new opportunities to enhance consumers' experience at the POS (Hagberg *et al.*, 2016). Drawing on perception research, they should be able to attract consumers' attention "bottom-up" by bringing in new, non-static and partially interactive stimuli into a familiar retail environment (Broadbent, 1958; Grewal *et al.*, 2017; Itti, 2005). This should enable the information presented via the respective technology to engage and activate consumers. However, scientific proof for the actual effectiveness of such digital promotion tools is rare (Burke, 2009; Willems *et al.*, 2017) and partly contradictory. While some studies find digital technologies to be a great opportunity for the retail industry (Lecointre-Erickson *et al.*, 2018), others assume that consumers completely ignore screens at the POS – the so-called phenomenon of "display blindness" (Memarovic *et al.*, 2007). The present study aims to counteract this confusion and gain new insights into the potential of innovative in-store technologies to engage consumers in more sustainable behaviour. It takes a closer look at the effects of advertisements via digital signage/magic mirror augmented reality applications on consumers' attention as well as the actual sales of sustainable products. In line with the rare existing studies on the effects of new digital technologies showing that they can attract customers' awareness and enhance their retail experience (Dennis *et al.*, 2014; Javornik, 2016a), we propose that they should be able to trigger sales for the advertised sustainable products.

H1. Advertising via digital in-store technologies increases the sales of sustainable products.

The technologies selected in this paper, namely non-interactive digital signage and magic mirror augmented reality, are both evaluated as promising tools to apply in retail environments (Javornik, 2016b). However, there is a remarkable difference between the two technologies, namely the possibility for customers to *interact* with digital signs. Non-interactive digital signage is the "digital advancement" of classic posters allowing retailers more flexibility. It represents a development of classic posters by displaying dynamic content such as videos (Want and Schilit, 2012), which was suggested to catch more attention than static content such as text or still images (see e.g. Huang *et al.*, 2008). Nevertheless, first empirical studies (e.g. Ervasti *et*

al., 2015) were not able to detect a significant difference between the effect of static vs. non-static content, hence effects are largely comparable to classic posters. The second technology, magic mirror augmented reality, represents an opportunity for consumer engagement by allowing consumers to interact with the technology. How this affects consumer behaviour has so far hardly been investigated and extant research is mainly conceptual (e.g. Boardman *et al.*, 2020) or only based on consumer reports (e.g. Poushneh, 2018), so further research is needed. Magic mirror applications showing consumers an augmented image of themselves might be particularly promising to attract customers' attention as the own face is detected significantly quicker among distractions than other faces (Tong and Nakayama, 1999). Devue *et al.* (2009) further found that peoples' attention is captivated longer by their faces or familiar faces, so a reflection of themselves seems to be a very attention-grabbing stimulus.

Furthermore, seeing oneself may also lead to a higher salience of social norms and thus to norm-conform behaviour according to the Theory of Objective Self-Awareness (Duval and Wicklund, 1972). The theory states that looking at one's own person in a (digital) mirror induces self-focused attention. This self-awareness triggers self-control with regard to social norms (Silvia and Phillips, 2013) and can lead to one's own behaviour being more in line with the perceived expectation of others (Duval and Wicklund, 1972; Geller and Shaver, 1976). Assuming that "buying green" is a social norm nowadays (White *et al.*, 2019), magic mirror augmented reality applications should not only increase customers' attention but also their sustainable purchases.

> *H2a.* The presentation of an advertising message via a magic mirror augmented reality application gathers more attention than a presentation via digital signage.

> *H2b.* The presentation of an advertising message via a magic mirror augmented reality application is more effective to promote sustainable purchases than the presentation via digital signage.

2.2 Construal Level Theory and Message Framing

Transforming the increased attention gained by new technologies into more sales of sustainable products additionally requires communicating the right messages via those technologies. Research on information processing shows that the human brain processes information matching existing cognitions faster and easier (Lee and Labroo, 2004). This so-called process fluency stimulates a positive feeling, which can, in turn, lead to more positive attitudes towards advertisements and higher buying intentions (Storme *et al.*, 2015).

Former research has applied this effect to create effective advertising messages for sustainable products referring to the Construal Level Theory of psychological distance (CLT; Trope and Liberman, 2010; Trope *et al.*, 2007). This theory has already been proven to be a suitable theoretical basis for researching sustainable consumption (Chang *et al.*, 2015; Ramirez *et al.*, 2015; Reczek *et al.*, 2018) and may be able to map existing cognitive structures. Thereby, it provides a basis to design "matching" advertisements.

According to the CLT, objects are represented in human minds on different mental levels – so-called construal levels – depending on their psychological distance. This distance is a subjective experience that something is close to or far away from the self, here, and now (Trope and Liberman, 2010) and can be triggered through four different distance dimensions: (1) *spatial*, i.e. how far away is something? (2) *temporal*, i.e. is it happening now or in the future? (3) *social*, i.e. does it concern myself or strangers? and (4) *hypothetical distance*, i.e. how likely is something to happen? (Liberman *et al.*, 2007). All dimensions have similar effects on how objects are represented in human brains: psychologically near (i.e. temporally, socially or spatially close) objects are mentally construed on a low-construal level, i.e. their mental representation rather focuses on details, whereas psychologically distant (i.e. temporally, socially or spatially remote) objects are thought of in a high construal-level, i.e. in high-level and abstract terms (Trope and Liberman, 2010).

Various studies show that messages matching the construal level an object category is associated with – i.e. matching existing cognitions – can have positive effects on consumers' (buying) behaviour (Chang *et al.*, 2015; Lucke and Koenigstorfer, 2018; Ramirez *et al.*, 2015; Trope *et al.*, 2007). There are different ways to manipulate the construal level of a message. Chang *et al.* (2015) and White *et al.* (2011b) both manipulated the perceived temporal distance in messages mentioning either a near time (this year, today) or a remote time (each year in the future, tomorrow). Reczek *et al.* (2018), in turn, use a concrete vs. abstract framing strategy: They advertised a car tire either with a very general description only calling it "environmentally friendly" or with a detailed description listing specifics about the tires' carbon footprint and impact on global warming. The positive effects of "construal-matching" of the message and existing product associations raise the question: Which construal level is congruent with sustainable products?

According to prior research, sustainability as a concept as well as sustainable products are perceived as psychologically more distant than conventional goods and are therefore represented on a high construal level in consumers' minds (Griffioen *et al.*, 2016; Reczek *et al.*,

2018). This results from the fact that the benefits for the environment appear rather abstract and future-oriented (Griffioen *et al.*, 2016; van Dam and van Trijp, 2011). Consumers cannot directly experience the positive effects which sustainable goods might potentially have in the future for the environment. Reczek *et al.* (2018) confirm that messages designed on a high construal level using rather abstract and distal terms are more effective in increasing purchase intentions for sustainable car tires than concrete, low-construal messages.

Nevertheless, research on CLT and sustainability is relatively rare and never distinguished between *different* sustainable product categories, but treated sustainability as a uniform attribute (Chang *et al.*, 2015; Lucke and Koenigstorfer, 2018; Reczek *et al.*, 2018). However, in the context of sustainable food choices, consumers often face the decision between different kinds of sustainable products – for example, organic and locally produced food. Although both product types may be classified as "sustainable", they differ largely in their attributes, argumentation (van Herpen *et al.*, 2012) and probably also in their perceived psychological distances. While organic food products are presumably mainly associated with an overall benefit for climate, environment or society, locally produced goods include a promise to strengthen the economy in the direct surrounding of the buyer and to be "fresher" (Roininen *et al.*, 2006). So, associations with locally produced food may be rather psychologically close and the products therefore depicted on a low construal level. Hence, we make the novel prediction that there might be an interaction effect with low-level construal messages being more effective for local food and high-level construal messages boosting sales for organic food.

H3a. High-construal advertising messages are more effective in increasing the sales of organic products than low-construal messages.

H3b. Low-construal advertising messages are more effective in increasing the sales of locally produced goods than high-construal messages.

With the integration of POS technology research and CLT message design research, we propose a multi-level process of how advertisements at the POS may increase purchases of sustainable food products. First, we compare the effectiveness of static digital signage and an interactive augmented reality application to generate attention and increase sales. Second, we test different messages based on the idea that customers' associations with organic food are matching high construal ads while associations with locally produced food match low construal level ads. The theoretical assumptions of this paper and the proposed hypotheses are graphically summarized in Figure 2.
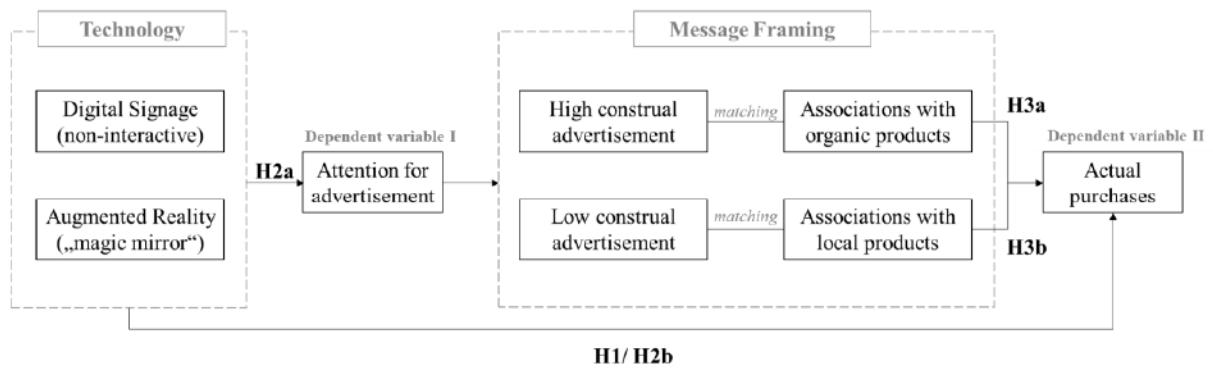
Figure 2: Proposed two-step process model and hypotheses.

3   Research Methodology

To test the stated hypotheses, a two-week field experiment was conducted with a 2 (product label: organic vs. local) x 2 (message framing: high vs. low construal level) x 2 (presentation technology: digital signage vs. magic mirror augmented reality) design in cooperation with a German retailer and a startup providing the in-store technology solutions.

Product selection. Products from the same category were compared, namely organic vs. locally produced milk. This product category was selected since milk is one of the most frequently bought food products, so changes in consumer behaviour could have a comparatively large positive impact on the environment. Consumers do not have strong brand preferences for milk as a low-involvement product (Thøgersen *et al.*, 2012), so stimulating behavioural change should be easier. Furthermore, prior research suggests that sustainable advertisements might be especially promising for low-involvement, virtue products such as milk (van Doorn and Verhoef, 2011; Thøgersen *et al.*, 2012). Lastly, it was possible to select organic and local brands in the milk category, which were similarly established in the test region and, therefore, comparable.

Message Design and Pretest. Four sets of four short advertisement messages were designed (organic vs. local x high vs. low construal) for presentation on the digital screens. The 16 messages were designed according to the CLT and in reference to recent studies (e.g. Tangari *et al.*, 2015; Willems *et al.*, 2017). Both, distance dimensions as well as the degree of abstraction, were manipulated to assure a clear difference between the messages. High construal messages were all formulated holistic (i.e. abstract) and half of the slogans emphasized a future focus (i.e. high temporal construal, e.g. *"think about the future", "do something good in the long run"*), while the other half focused on collective benefits (i.e. high social construal, e.g. *"because we take the responsibility for the environment!"*). Low construal messages addressed

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the consumer at a temporally / socially closer level, focusing on immediate or personal benefits and were formulated using concrete wording, e.g. *"because it contains 60% more healthy omega-3 fatty acids than conventional milk."* The slogans were designed as similar as possible in all four conditions, only varying in relevant keywords. A pretest with 41 student participants was conducted to assess credibility and comprehensibility of the slogans and check whether the manipulation was successful. The participants were randomly assigned to one of the four conditions (organic vs. local x high vs. low CL) and asked to rate all slogans for that condition regarding credibility and comprehensibility (7-point semantic differentials ranging from 1 = 'not credible/comprehensible at all' to 7 = 'absolutely credible/comprehensible'). Unifactorial ANOVAs confirmed, that the conditions did not differ in credibility or comprehensibility [overall credibility: $M_{OrganicLow}$ = 4.34, $M_{OrganicHigh}$ = 4.18, $M_{LocalLow}$ = 4.10, $M_{LocalHigh}$ = 3.98, $F(40)$ = .958, $p > .05$); overall comprehensibility: $M_{OrganicLow}$ = 5.50, $M_{OrganicHigh}$ = 5.48, $M_{LocalLow}$ = 5.75, $M_{LocalHigh}$ = 5.43, $F(40)$ = .965, $p > .05$]. Afterwards, participants were asked to rate the manipulated dimensions of psychological distance for each slogan (7-point semantic differentials; social distance: 1 = 'benefit for myself', 7 = 'benefit for others/the society' or temporal distance: 1 = 'immediate benefit', 7 = 'benefit in the future') and the messages overall concreteness / abstractness (1 = 'very concrete', 7 = 'very abstract'). The manipulation of the distance dimensions as well as abstractness between high and low construal messages was proven successful across all four slogans within independent samples t-tests [social/temporal distance: M_{Low} = 2.36, M_{High} = 5.44, $t(39)$ = -20.64, $p < .001$; abstractness: M_{Low} = 3.16, M_{High} = 4.96, $t(39)$ = -12.49, $p < .001$].

The stimuli were presented on digital screens provided by the cooperating technology startup. In the digital signage version, speech bubbles containing the tested slogans appeared above the image of a model and changed every three seconds. In the magic mirror version, the customer saw him-/herself on the screen while the slogans were shown in speech bubbles around him/her and altered every three seconds (see examples of the final stimuli in Appendix A1). In the bottom part of the screen, a packshot of the advertised product was shown as well as the actual price (organic: €1.09, local: €1.29). Although the organic milk was slightly cheaper (≈16%) than the locally produced milk, the data show that customers still prefer the local milk brand (see section 4.1 and Appendix A2).

Experimental Setting. Two grocery stores were selected in the city area of Leipzig (Saxony, Germany) where the advertising screens were positioned and provided with the slogans for two weeks. We conducted the study in two separate stores to increase the amount of comparable

data gained during the experimentation weeks. Furthermore, two stores considerably different in size and location were selected to be able to investigate potential interaction effects of the POS technologies and those factors. The first store was noticeably smaller than the second one since it was located in the downtown area. According to our cooperating retailer, customers made smaller, immediate purchases in that store (e.g. bought lunch in their lunch break), while the other store was located more remote and rather used for weekly grocery shopping. We suspected that people in the smaller downtown store experience more time pressure during shopping, are less open to new technologies at the POS and therefore less likely to be influenced by the advertisements (see Roggeveen *et al.*, 2016). A balanced display rotation was created to link the purchase data provided by the retailer with the respective experimental condition. Each of the four conditions (organic vs. local x high vs. low construal level messages) was presented equally long with each technical condition and in each store. To achieve this, the displayed condition changed once a day, so a condition was active for a time slot of six hours before the next condition was activated. We paused the screens for one hour between the conditions every day to assure a clear separation of effects. In total, we gathered data for 24 time slots per store (two time slots per day x six days per week x two weeks).

Dependent Variables. The number of sustainable milk purchases as well as the amount of milk purchased in the different experimental conditions was provided by the retailer and compared to each other as well as to a reference period (two weeks without promotion). Furthermore, visual attention data was collected by facial recognition software integrated into the screens. The software captured how many people looked at the advertisement screen and how long they looked at it on average for each time slot. The facial recognition software classified customers into four different age groups (infant, young, middle or elder) and sorted by gender. Due to the data aggregation to time slot level, no conclusions regarding single customers were possible. Moreover, customers' anonymity was ensured as the video material of the customers was not saved by the screen.

4 Data Analysis and Results

4.1 Descriptive Results and Preparation of Data Analysis

In sum, 754 customers purchased milk in the large store during the two-week experimental period. Out of these purchases, customers chose 40 times the organic milk brand and 113 times the local milk brand (see Appendix A2). In the smaller store, 284 milk purchases were registered in the same time period, including 32 organic purchases and 40 local milk purchases. On average, customers spent 15 to 16 € per purchase (larger store: €15.93, smaller store:

€15.41) and bought 10 to 11 different items (larger store: 11.2, smaller store: 10.1). While the purchase value differed not significantly in both stores ($t(3112) = 0.80$, $p > .1$) the difference between the number of purchased items was highly significant ($t(3112) = 3.33$, $p < .001$).

To test the experimental effects, we only included purchases from the time slots in which the respective organic/local brand was advertised. Furthermore, as prices for different product variants slightly differ (organic/local milk with lower fat content is 4/10 cent cheaper), we only included purchases of the advertised product variant. Therefore, the final sample consisted of 122 purchases in total and 136 packages of organic or locally produced milk, respectively. Table 2 gives an overview of the outcome variables used for the statistical analyses of the purchases aggregated by time slot, namely the *number of organic/local packages bought* (PO, PL) and the *number of customers buying organic/local* (CO, CL). Furthermore, the facial recognition software registered 5,218 customers and was also used to analyze the socio-demographic structure of shoppers visiting the store during the experimental weeks in terms of age and gender.

Table 2: Descriptive statistics of outcome variables used for further analyses of purchase data.

	Organic milk	Locally produced milk
Number of packages bought per time slot*	PO (Mean: 1.31; SD: 1.52 Min: 0; Max: 6)	PL (Mean: 2.10 SD: 2.43 Min: 0; Max: 12)
Number of customers buying per time slot	CO (Mean: 0.92; SD: 1.11 Min: 0; Max: 6)	CL (Mean: 1.63; SD: 1.91 Min: 0; Max: 10)

*Purchases of more than 8 packages of milk bought by one person have been excluded since those purchases are outliers which disproportionally increase the purchase amount per time slot.

As can be seen in Table 3, the people looking at the screens were dominantly male (augmented reality (AR): 68% men, digital signage (DS): 62% men) and either younger or middle-aged (AR: 48% young, 44% middle-aged; DS: 46% young, 48% middle-aged). Hence, the distribution across gender and age groups was comparable for both technological conditions. A Kruskal-Wallis-Test of the attention data revealed that the numbers of men and women looking at the screen and the age of the customers did not differ significantly between the four message conditions (all $p > .05$), so we assume that the display rotation plan was successful and there were no biases due to the customer mix.

4.2 Results regarding In-Store Technologies

To test *H1*, the purchase data collected during the two experimental weeks was contrasted to the comparative data from two control weeks. Since these variables are not normally

distributed (Kolmogorov-Smirnov test was highly significant for all variables, $p < .001$), we used non-parametrical Mann-Whitney U tests. When pooling the purchase data of both grocery stores, there existed no significant difference for any of the four outcome variables. Hence, overall, consumers did not buy significantly more organic or locally produced milk in the experimental conditions than without the advertisement. Nevertheless, some significant effects become visible when analyzing the two stores separately. In the larger store, significantly more packages of organic milk were bought during the experimental weeks than during the comparative weeks ($U_{PO} = 186.500$, $p < .05$) and marginally significant more customers bought organic milk ($U_{CO} = 204.000$, $p < .1$; see Figure 3). Furthermore, significantly more packages of local milk were bought during the experimental weeks ($U_{PL} = 195.000$, $p < .05$) by significantly more customers ($U_{CO} = 193.500$, $p < .05$). So, there is evidence for $H1$ for one of the two stores for both organic and local milk.
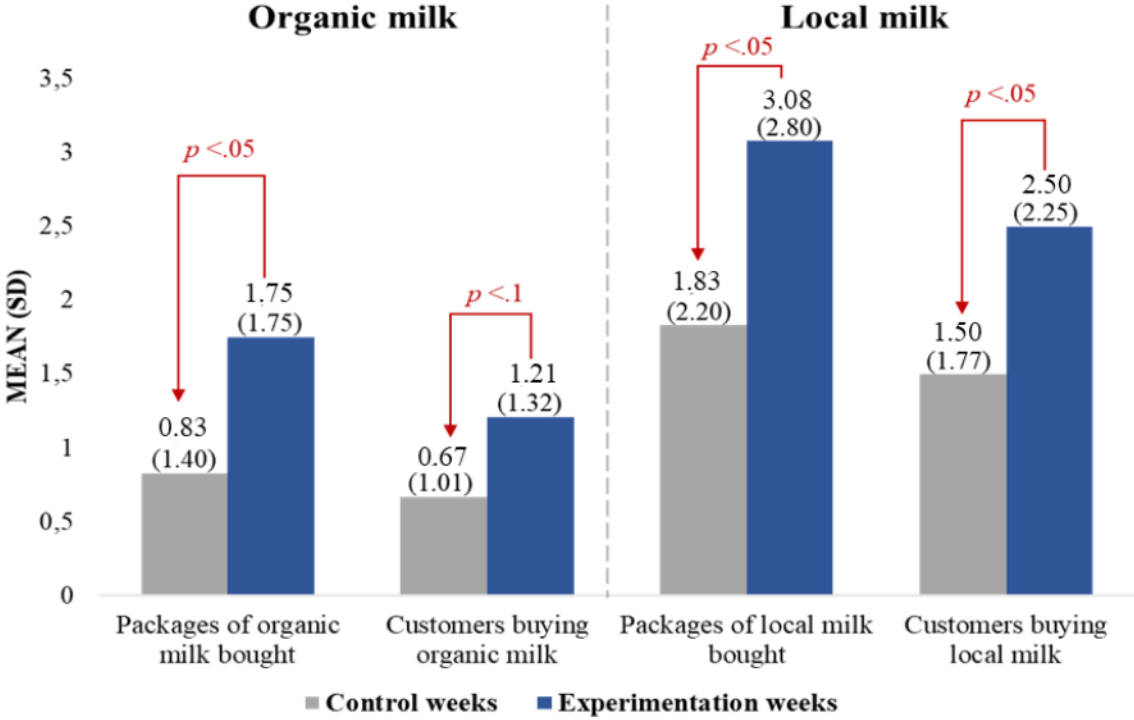
Figure 3: Mean differences (and SD) between the sales of organic/local milk per time slot in the control weeks vs. experimentation weeks in the large store (store 1).

As a next step, we analyzed if magic mirror augmented reality technology is more effective regarding generating attention (*H2a*) and promoting sales (*H2b*) compared to digital signage, using Mann-Whitney U tests for the non-normally distributed number of customers looking at the screen and t-tests for the normally distributed time spent by customers looking at the screen (see Table 3 and Table 4).

Table 3: Comparison of the average number of customers looking at a screen per time slot in the two different technological conditions (AR/DS).

	Mean number of customers per time slot (six hours)						
	all customers	men	women	infant	young	middle-aged	elder
AR	234.75 (SD: 108.73 Min: 107 Max: 450)	159.63 (SD: 74.45 Min: 55 Max: 259)	75.13 (SD: 50.56 Min: 34 Max:191)	15.50 (SD: 12.00 Min: 2 Max: 37)	111.88 (SD: 76.33 Min: 49 Max: 295)	103.25 (SD: 54.77 Min: 42 Max: 185)	4.13 (SD: 4.70 Min: 0 Max: 13)
DS	116.08 (SD: 42.03 Min: 68 Max: 195)	72.00 (SD: 34.44 Min: 38 Max: 162)	43.33 (SD: 15.95 Min: 24 Max: 78)	3.67 (SD: 2.64 Min: 0 Max: 9)	53.58 (SD: 20.59 Min: 31 Max: 99)	55.92 (SD: 34.94 Min: 13 Max: 152)	2.92 (SD: 2.78 Min: 0 Max: 9)
U	11.000	12.000	23.000	15.500	10.000	18.000	46.500
p	< .01	< .01	< .1	<.05	< .01	< .05	= .910

Notes: AR = augmented reality, DS = digital signage.

Table 4: Comparison of the average time customers of different customer groups spent looking at a screen in the two different technological conditions (AR/DS).

	Mean time spent looking at the screen per customer (in seconds)						
	all customers	men	women	infant	young	middle-aged	elder
AR	2.53 (SD: 0.33 Min: 2.00 Max: 3.17)	2.52 (SD: 0.47 Min: 2.00 Max: 3.50)	2.40 (SD: 0.59 Min: 1.20 Max: 3.00)	1.43 (SD: 0.88 Min: 0.17 Max: 2.67)	2.27 (SD: 0.67 Min: 1.80 Max: 3.83)	2.61 (SD: 0.28 Min: 2.33 Max: 3.00)	0.85 (SD: 0.78 Min: 0.50 Max: 1.83)
DS	1.84 (SD: 0.24 Min: 1.40 Max: 2.20)	1.83 (SD: 0.29 Min: 1.33 Max: 2.33)	1.65 (SD: 0.25 Min: 1.33 Max: 2.20)	0.78 (SD: 0.61 Min: 0.33 Max: 2.20)	1.43 (SD: 0.28 Min: 1.00 Max: 1.50)	2.09 (SD: 0.34 Min: 1.50 Max: 2.80)	0.85 (SD: 0.60 Min: 0.20 Max: 2.00)
$t(19)$	5.50	4.05	3.90	1.94	3.89	3.57	0.22
p	< .001	< .01	< .01	< .1	< .01	< .01	= .982

Notes: AR = augmented reality, DS = digital signage.

Across all customer groups, we found that significantly more participants looked at the screen when an AR advertisement was active compared to time slots when a DS advertisement was shown (see Table 3). Only for older customers there was no significant difference, which might be caused by the small overall number of older customers. People spent on average 2.12 seconds in front of the screens (SD: 0.44, Min: 1.40, Max: 3.17). Independent sample t-tests revealed that all customer groups – except the elder ones – spent significantly more time in front of the screens when an AR advertisement was active than when a DS advertisement was active (see Table 4). Therefore, *H2a* is widely supported by the data.

Using Mann-Whitney U Tests, it was investigated whether there were significant differences between the amounts of milk bought or the number of customers in the AR vs. the DS conditions. However, neither for organic milk ($M_{PO-AR} = 0.92$, $M_{PO-DS} = 1.71$, $U_{PO} = 70.500$, $p = .927$; $M_{CO-AR} = 0.63$, $M_{CO-DS} = 1.21$, $U_{CO} = 67.500$, $p = .772$) nor for locally produced milk ($M_{PL-AR} = 2.58$, $M_{PL-DS} = 1.63$, $U_{PL} = 68.000$, $p = .813$; $M_{CL-AR} = 2.08$, $M_{CL-DS} = 1.17$, $U_{CL} = $

65.000, p = .676) there were any significant differences. Despite the "attention-boosting" effect of the AR technology, the two technologies had similar effects on the purchase behaviour of the customers. Hence, *H2b* was not supported by the data.

4.3 Results regarding the Message Framing

To test the hypotheses *H3a* and *H3b*, it was analyzed if a specific advertisement (high vs. low construal) is more effective for a certain sustainable product type (local vs. organic) using Mann-Whitney U tests. Descriptively, we see an interaction effect (see Figure 4): purchases of local milk increase in the condition of high-construal advertisements, while purchases of organic milk increase when low-construal messages are shown. Thus, the direction of the interaction effect is against our original hypotheses. However, these differences were statistically mostly insignificant: we found a marginally significant difference for the amount of purchased organic milk (U_{PO} = 39.500, $p < .1$), while the number of customers buying organic milk differed not significantly (U_{CO} = 48.000, p = .178). For locally produced milk, neither the amount (U_{PL} = 48.000, p = .178) nor the number of customers differed significantly (U_{CL} = 51.500, p = .242).
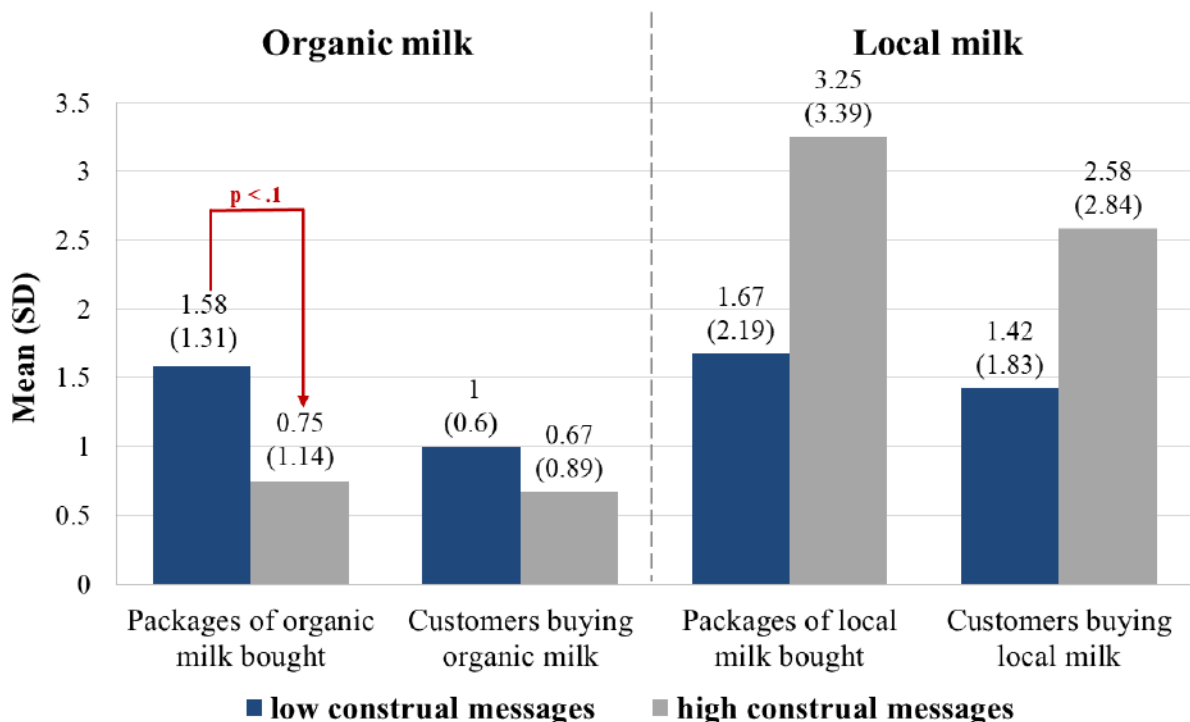
Figure 4: Mean differences (and SD) between the sales of organic/local milk per time slot when low vs. high construal level messages were presented.

As further investigations showed, the marginally significant effect on organic milk purchases is mainly evident in the AR time slots. In the AR condition, low construal messages

significantly increased organic milk purchases compared to high construal messages (U_{PO} = 3.000, $p < .05$; U_{CO} = 5.000, $p < 0.5$; see Figure 5), but not in the DS condition ($M_{PO\text{-}LCL}$ = 1.44, $M_{PO\text{-}HCL}$ = 0.89, U_{PO} = 16.500, $p = .818$; $M_{CO\text{-}LCL}$ = 0.89, $M_{CO\text{-}HCL}$ = 0.78; U_{CO} = 17.500, $p = .937$). For local milk, still none of the differences is significant, even when AR and DS are analyzed separately.
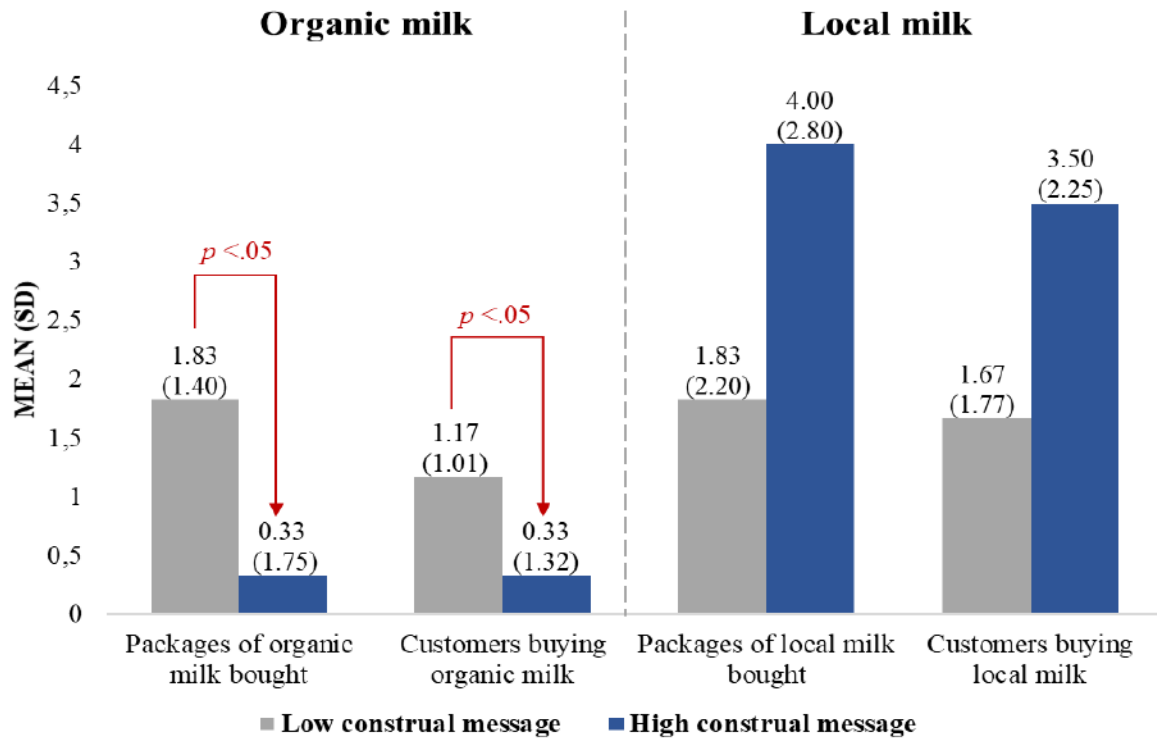
Figure 5: Mean differences (and SD) between the sales of organic/local milk when low vs. high construal level messages were presented via magic mirror augmented reality.

Therefore, hypotheses *H3a* and *H3b* cannot be confirmed. Differently than expected, not high but *low* construal level messages work better to promote purchases of organic milk. Interestingly, we did not find such an advantage for locally produced milk – here, data suggests at least descriptively that high construal messages are more effective. Thus, the general idea of an interaction effect, i.e., that different construal levels need to be activated for different product types, seems to be supported by the data. This indicates that none of both message framing strategies is generally more successful than the other; instead, both strategies (messages on high and low construal level) seem to be successful, but each for different sustainable product types. However, these results should be considered with caution since we only found significant results for organic milk in the AR condition.

5   Discussion and Implications

Within the present study, we investigated a two-step approach to increase sustainable consumption combining POS technology research and consumer psychology. Conducting a two-week in-store experiment, we first analyzed the potential of two different in-store technologies to raise consumers' attention to green advertisements. We confirmed our hypothesis that consumers' attention for advertisements can especially be increased by the use of magic mirror augmented reality applications compared to non-interactive digital signage. Advertising via both technologies was able to increase the sales of the advertised products in one of the two investigated stores. Our second assumption was that the framing of the advertisement influences, in a second step, the messages' effectiveness if consumers pay enough attention to the presented message. We found a significant increase in sales figures of organic milk when concretely framed, low construal advertisements were presented via the magic mirror augmented reality application. The presented results of POS technology and message framing are now discussed in detail to draw conclusions for our proposed two-stage effect model as well as future research and advertising practice.

5.1 Discussion of the Effects of Digital In-Store Technologies

Based on perceptual research, we assumed that consumers' attention must first be attracted to engage and activate them with targeted messages. We were able to show that magic mirror augmented reality applications, in particular, can be an innovative tool for this purpose at the POS. Compared to non-interactive digital signage, which we used as a comparison since it is based on the same display principles as classical posters and relatively common in retail environments, in almost all customer groups twice as many people spent about one second more time in front of the screens. This attention-boost confirms the findings of previous research suggesting that one's own reflection can draw the visual attention of consumers (Tong and Nakayama, 1999; Devue *et al.*, 2009). Furthermore, we were able to quantify this previously assumed attention-boost effect in a realistic retail setting: The magic mirror was able to attract 102% more customers and increase their attention time-span by more than 37% compared to the non-interactive digital signage. This quantification enables marketers to allocate their budgets better and assess the success of POS measures for brand and product awareness beyond immediate sales numbers.

Our basic assumption that the promotion of sustainable products with POS technologies should increase sales of these products compared to a control period without advertisement was only confirmed in one of the two test-stores. We suppose that this was mainly due to the different sizes and locations of the stores. It can be assumed that customers experience more

time pressure (e.g. in their lunch break or on their way home) in the smaller-sized downtown store, where no effects were detected. They might, therefore, not be ready to engage with any presented message and rather ignore them (Kao, 2011). This assumption is also confirmed by another field study showing that displays have a positive effect on sales in larger stores, but even an adverse effect for small stores (Roggeveen *et al.*, 2016). Besides time pressure, this effect might also be caused by the physical conditions: In the smaller stores, the optimal positioning of screens is more demanding. In our case, the display was, for example, partially covered by other goods from some viewing angles and consumers barely had room to stop in front of the screen.

Referring to our proposed two-stage process model, we therefore propose an extension: New technologies might indeed raise consumers' initial attention. Nevertheless, whether this initial attention is high enough to trigger actual purchases not only depends on the appropriate technology, as we suggested, but also on situational factors. Enriching classical models of attention research (see e.g. Broadbent, 1958), this means that the first attention filter is not only based on the physical conditions of a stimulus (e.g. novelty of stimulus, recognition of the own face), but probably also on situational factors such as consumers' time pressure or spatial conditions. Future studies should therefore examine these attention-inhibiting factors. It would also be of great interest, whether technological and situational factors act independently or interact with each other. Based on the presented results, it should already be emphasized that practitioners need to consider situational in-store factors when planning to adopt in-store technologies.

We further assumed that magic mirrors should lead to increased sales figures compared to the non-interactive digital signage when keeping the message framing balanced. This assumption was not confirmed since both technologies did not differ significantly from each other in their potential to promote purchases. While one's reflection is apparently able to generate attention (as presumed referring to Tong and Nakayama, 1999 as well as Devue *et al.*, 2009), it does not automatically trigger purchase decisions by activating environmental norms, as we presumed based on the Theory of Objective Self-Awareness (Duval and Wicklund, 1972). We suspect this lack of direct influence is due to the latency that existed between the activation of the social norm and the actual purchase decision. Previous studies on norm-activation effects of self-awareness were predominantly laboratory experiments in which the behavioural task directly followed the manipulation of self-awareness (e.g. Silvia and Phillips, 2013; Geller and Shaver, 1976). In our field experiment, however, there was a certain spatial distance between

the screen and the milk shelf, so consumers were confronted with various other impressions on their way and possibly made other purchase decisions. These distractions could have weakened the activated social norm. Since it is often not possible in real shopping environments to force a purchase decision immediately after the customer uses a magic mirror application, this result emphasizes the importance of transporting convincing messages with POS technologies. The increased attention gained by magic mirrors must be directed to effective advertisement messages to trigger purchase decisions some minutes later. Taking a closer look at the effects of construal level framing, it becomes clear that the choice of technology has a decisive impact on the effectiveness of framing strategies indeed.

5.2 Discussion of the Effects of Construal Level Message Framing

After the initial attention filter, we assumed that weather a message is processed deeply or not may be influenced by process fluency induced by a match between existing cognitions and the presented message (Lee and Labroo, 2004). Based on this idea and its' application to construal level research, we initially proposed an interaction effect between high (vs. low) construal messages and organic (vs. locally produced) products on the purchase data due to a match between existing cognitive structures and message types. However, our results deviated from this general expectation in several ways.

First, significant differences only occurred when the advertisements were presented via magic mirror augmented reality, but not via non-interactive digital signage. Although not stated in a separate hypothesis, this result fits our explanatory model proposing that only magic mirror augmented reality, but not digital signage, is able to stimulate enough attention for further deep message processing. Attention data confirmed our hypothesis that consumers looked at the screens significantly longer in the magic mirror condition. We suspect that it was only through this longer attention span that consumers were able to read the text messages and then process them, which is why message framing could only have different effects on buying behaviour in the augmented reality condition. In the non-interactive digital signage condition, positive associations with the advertised product may have been activated unconsciously by the brand name or image, which then promoted sales. However, there was not enough attention to process the presented messages (see e.g. van Meurs and Aristoff, 2009). This finding has far-reaching consequences for advertising practice: Only the magic mirror screens were able to create sufficient processing depth for the inclusion of new information. So, if an advertisement campaign is designed to convey new product information to the consumer or present an unknown product, the presentation medium, i.e. the selected POS technology, necessarily has

to gain sufficient attention for it first. So, the effect of all other design strategies for advertising messages requiring a deeper (text) processing is probably dependent on generating sufficient attention for them, further stressing the importance of the presented two-step process.

Second, the direction of the message effect found in the augmented reality condition contradicted our expectations since concrete, low construal messages were more successful than abstract, high construal ones for organic milk. Construal level research associated sustainability with abstractness (see Griffioen *et al.*, 2016; Reczek *et al.*, 2018), which would point to an advantage of high construal messages. However, other studies show that health and taste considerations strongly motivate organic food consumption (Hughner *et al.*, 2007; McEachern *et al.*, 2005). These drivers represent personal benefits, which are psychologically very close to consumers and have already been argued to match with concrete, low construal messages (Yang *et al.*, 2015). Hence, from a consumer perspective, organic food is not primarily seen as an abstract means to sustainability, but as a concrete means for personal health and well-being, so respectively framed low-construal messages are more effective.

We did not find any significantly different effects of message frames on the sales of local products, although their sales were in total also increased by the in-store technologies – probably because of increased brand awareness. We suspect that consumers associate local products with less uniform cognitions than organic ones due to the standardized legal regulation of organic production and frequent promotion of organic products in green advertisements (see Adams and Salois, 2010). On the one hand, local products may be associated with spatial proximity; on the other hand, however, "local production", unlike "organic", is no protected term in Germany, which means that local products could be perceived as riskier (i.e. hypothetically distant). These diverse, less strongly anchored existing cognitions could have resulted in no apparent message framing effects. Future studies should therefore investigate which associations customers have with locally produced products to use the advantage of matching cognitions for those products as well.

5.3 Managerial Implications

By integrating attention and construal level research, our study presented several valuable findings on how to optimize the use of digital in-store technology for retailers. We were able to show that magic mirror augmented reality applications are not only a promising tool to gain customers' attention, but also to increase sales of organic products when the communicated messages match existing benefit-associations consumers have with the promoted product.

Thereby we propose a two-step model for engaging customers in green consumption at the POS: First, retailers have to enhance the retail environment by new, interesting stimuli improving the customer experience to attract customers' attention. Compared to non-interactive digital signage, magic mirror augmented reality screens are shown here to be especially promising since the reflection of the own face attracts (self-)attention (102% more customers, 37% longer attention time-span). However, future research has to investigate the attention-gaining potential of other digital POS technologies. Aiming for consumer engagement as it is done within this paper, particular attention should be paid to those technologies that enable consumers to interact with the technology, e.g. with an artificial intelligence responding to verbal and non-verbal reactions by the consumer. Second, retailers have to find the right messages, which are easy to process and engaging the consumer. As a general rule of thumb, messages should be kept as short as possible. Our data confirmed the results by Huang *et al.* (2008) stating that people only spend 2-3 seconds looking at a display. Although the augmented reality magic mirror application expanded this time by about one second, retailers have to engage and activate consumers very quickly. Further, our results showed that an effect of augmented reality advertising on the sales of organic milk could only be proven for low construal messages. Drawing on process fluency, we therefore argue that organic products should rather be promoted with low construal messages matching the self-benefit associations customers have with those products, i.e. health and taste. To match the low construal level, messages should use concrete and precise language to promote immediate benefits for the consumer him- or herself.

Our results further indicated that POS applications are more suitable for large stores where they can be positioned prominently, and consumers have enough time and space to interact with them. At the same time, this raises the question of how sustainable consumption should then be stimulated in smaller shops amongst consumers with time pressure. Retailers might consider shaping consumers' choice situation, e.g. through certain positioning or colour-marking of products (see Lehner *et al.*, 2016), which future studies should further investigate. Overall, our results lead us to the conclusion that joint consideration of situational factors such as store size and psychological factors such as attention-gaining stimuli as well as the interaction of message design and existing cognitions are crucial for engaging consumers into more sustainable consumption at the POS.

5.4 Limitations and Future Research

To guarantee a maximum of validity, we analyzed attention data gathered by facial recognition software and real purchase behaviour instead of relying on self-report data or purchase intentions. Hence, the methodological merits of this study are the use of objective outcome measures as well as an unobtrusive experimental design where consumers are not aware of being part of a study. Thereby, it was possible to control for response effects such as social desirability bias which is often an issue for surveys on sustainable behaviour based on self-reports (Carrington *et al.*, 2010). Nevertheless, there is a potential for bias from confounding factors in field studies.

First of all, one weakness of this study might have been a price reduction of a competitor brand during the first week of the experiment. A logistic regression analysis confirmed that this led to an increase in sales of this non-sustainable milk brand in the first week of the experiment. While organic milk sales nevertheless increased in the first week of the experiment, sales of local milk only started to increase in the second week (see data for store 1 in Appendix A2). This suggests that the reduced milk competed particularly with the local milk and overshadowed the effects of the advertisement. However, promotions of competing non-sustainable products are a natural disruptive factor for sustainability marketing. Future research should therefore focus on interventions triggering stable long-term shifts to more sustainable purchasing behaviour despite short-term competitions through non-sustainable alternatives.

Second, the selection of stores with different sizes may have been partly responsible for some insignificant results in the smaller store, as discussed earlier. Third, the overall amount of milk sold during our two experimentation weeks and also during the control weeks was quite low, which also exacerbates finding significant effects due to low statistical power. Future studies should try to analyze greater amounts of data (e.g., selecting big stores with higher customer traffic and sales volumes). By conducting customer interviews, it should be checked if the manipulation by the advertising stimuli works as intended, not only in a pretest but also in the store environment. The design of the construal level messages should be reconsidered according to which associations are dominant in consumers' minds for which type of sustainable product. To identify those associations, implicit association tests could be applied (Lucke and Koenigstorfer, 2018).

Future research should further explore the effects found here in a German retail context in different cultures for two reasons: First, POS technologies could generate a different level of

initial attention in other countries, depending on how established the respective technology is. While non-interactive digital signage screens are relatively well-known in the German retail environment for more than ten years (Zentes and Rittinger, 2009) and therefore generate less attention as shown in this study, they could still be highly effective in other countries, e.g. in emerging markets for retail technologies and sustainable food such as India. In contrast, if the retail market is already infused with digital POS technologies, e.g. in urban China (see e.g. Lyu *et al.*, 2019), even magic mirror applications could fail their purpose, since customers are more used to seeing their faces in magic mirrors. Newer, more engaging technologies might have to be adopted here, such as hologram advertisements. Furthermore, consumption habits and market shares of organic food products differ largely between countries and continents (Thøgersen, 2010; Willer and Lernoud, 2019). While consumers in Germany are quite familiar with different types of sustainable food and express a general intend to purchase environmentally-friendly (see e.g. Hempel and Hamm, 2016), this might not be the case in other countries. A study by Liu *et al.* (2012) suggests, for example, that green consumption is relatively rare in urban China, and consumers first need to be informed and educated about organic products before marketers can apply strategies like construal level framing to match existing cognitions and increase organic purchases. A moderating role of knowledge between antecedents of green consumption and green purchase intentions was also found in Tanzania and Kenya (Wang *et al.*, 2019), so educational advertisements might work better here. We would, therefore, particularly like to recommend researchers to explore the results found here further in emerging markets for sustainable consumption, where sustainable consumption patterns and established POS technologies differ from Western Europe.

Despite the weaknesses this study suffered from, it nevertheless opened up a promising field for future research on the promotion of different sustainable product categories at the POS. Therefore, other researchers shall be encouraged to proceed with these ideas and conduct replication studies tackling the discussed limitations and research gaps. Other sustainable products such as clothing, beauty products or high-involvement food categories should also be investigated to generalize the results and detect potential differences. Furthermore, different in-store technologies such as virtual reality glasses or mobile augmented reality applications could be investigated on their potential to increase sustainable consumption. The results of the present study support the proposed two-step model combining the attention-boosting effect of new technologies at the POS with relevant psychological theories to design effective advertising messages. This approach may help to increase green consumption amongst a wide range of consumers. Only if a thorough understanding of consumer behaviour and the underlying

psychological processes is achieved by further research, it will be possible to use this knowledge for attaining an overall greener economy.

References Section B - Article I

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Appendix Section B - Article I

Appendix A.1: Examples for the message presentations in the DS condition (example 1 and 2) vs. in the AR condition (example 3) in the original language (German).

| Example 1: high construal message, local product, DS | Example 2: low construal message, organic product, DS | Example 3: low construal message, organic product, AR |

Appendix A.2: Overview of milk sales during the experimental and comparison weeks in the two test stores (number of purchases including milk).

	Week	Total sales (all brands)	Total sales organic milk*	Organic milk sales (advertised product)	Total sales local milk*	Local milk sales (advertised product)
Store 1 (larger store)	Comparison 1	349	12	9	63	21
	Comparison 2	332	12	11	53	15
	Test 1	374	27	19	51	21
	Test 2	380	13	12	62	44
Store 2 (smaller store)	Comparison 1	153	20	12	30	15
	Comparison 2	165	19	12	30	16
	Test 1	165	15	9	26	11
	Test 2	119	17	11	14	9

* Total sales organic/local includes product variants of the same brand (different fat content or packaging size).

C. Article II: Can you believe it? The effects of benefit type versus construal level on advertisement credibility and purchase intention for organic food

Authors: Anna-Katharina Jäger, Dr. Anja Weber

D. Article III: "Let me decide how green you are!" – The effects of green consumer empowerment on corporate evaluations and purchase intention in advertising

Authors: Xisi Yang, Dr. Anja Weber, Anna-Katharina Jäger

Abstract

Green advertisement appeals that communicate a product's ecological benefit are likely to strengthen customers' perceptions of its company's green orientation but not its customer focus. This perceived neglect of customer needs could lead to a more negative overall evaluation of the company. In this article, we therefore investigate a new form of green advertising: empowerment ads that identify customer demand as the major driver of companies' decisions such as the adoption of eco-friendly manufacturing. We compare these ads with green appeals, which emphasize consumers' personal contribution to environmental protection, and we find significantly improved perception of the company's customer orientation and increased purchase intention when they see a green empowerment ad (nStudy1 = 291). Corporate environmental responsibility is also improved, although at a comparable level to green appeals. We further examine ad effectiveness depending on companies' resources (nStudy2 = 457), and find that a green empowerment ad that highlights both customer orientation and eco-friendliness is more effective for large, high-resource companies than for small companies. We find no evidence that small companies can boost their perceived environmental responsibility with green empowerment ads but that green appeals are effective for both large and small companies. We conclude that, overall, green empowerment is still the best advertising strategy.

Keywords: Green advertisement, consumer empowerment, customer orientation, green purchase.

1. Introduction

Severe ecological damage such as climate change demands major shifts in consumer behaviors. Increasingly, companies are responding to this altered consumer demand with eco-friendly products and operations (Ito and Zhang, 2016; Guoyou *et al.*, 2013). However, previous research shows that companies need to be cautious with unexpected adverse effects when advertising eco-friendly products. For instance, consumers show more negative product evaluations and decreased buying intentions if they perceive the product's environmental benefit to be intended by the company, as consumers assume that the company shifts resources from assuring product quality to environmental protection (Newman *et al.*, 2014). Thus, the endeavor of promoting consumer participation requires not only effective communication strategies, but also more academic research on consumers' cognitive responses to green advertising (Kong and Zhang, 2012). Previous research has broadly investigated green appeals, which focus on a product's ecological benefits, to increase consumers' perception of pro-environmental intentions and behaviors (Atkinson and Rosenthal, 2014a; Chang *et al.*, 2015). However, a crucial disadvantage of these appeals is that their effectiveness depends on a person's level of environmental involvement (Cheng *et al.*, 2020), such that green appeals may have little effect on less environmentally involved customers. Furthermore, appeals to the ecological impact of personal purchase can leave the impression that the consumer alone is obligated to take responsibility for environmental protection, which is inconsistent with consumers' belief that both consumers' and companies' actions can make a difference (Lenzen *et al.*, 2007; Yang and Weber, 2019; Buerke *et al.*, 2017). While consumers can primarily contribute through their product choices, companies face the challenge of implementing the eco-friendly operations and offering. Consumers' purchase choices are an essential driver of companies' operations and offerings (King and Venturini, 2005), and therefore, they also have a proactive role in the collaboration for environment conservation.

Further, consumers' product choices can be understood as their purchasing power, which can be exerted over the company (Buerke et al. 2017). A communication tactic that embraces this consumer power and, thereby, shifts decision power from the company to the customer in the green purchase context can be viewed as "green consumer empowerment." Fuchs *et al.* (2010) demonstrate that consumer empowerment in the phase of product development enhances attitudes toward the company and purchase intentions. Therefore, such an empowering green ad could lead to consumers evaluating the company more positively in two ways. On the one hand, the company demonstrates its environmental responsibility. Previous studies deliver evidence that consumers respond positively to corporate social and environmental activities

(Nan and Heo, 2007). On the other hand, the company also appears to be more customer oriented, in the sense that it bases its production decisions on consumer demands. Both customer orientation and environmental responsibility are positively related to a company's overall reputation (Berens *et al.*, 2005; Walsh and Beatty, 2007; Berens *et al.*, 2005). Therefore, a green empowerment ad might be a valuable strategy for manufacturers of sustainable products. To date, however, researchers have mainly examined empowerment as a strategy in human resource management (see Liu et al. 2019), where it has proved to be a useful means to increase green behavior (Tariq *et al.*, 2016; Saeed *et al.*, 2019). In contrast, few studies investigate consumer empowerment with regard to increasing green purchase behavior (Akhavannasab *et al.*, 2018).

Furthermore, little research addresses whether characteristics of the company, such as company size, influence the effectiveness of a green empowerment ad. Depending on the company size and resource availability (e.g., technological know-how, financial capital), consumers might have different expectations about the companies' ability to react to consumers' demand and to implement more eco-friendly technologies in the production (Wu, 2017).

Two empirical studies explore the effects of empowerment elements in ads for green products on consumers' corporate evaluations and, therefore, green purchase intention compared with other ad types. Study 1 tests a green empowerment ad against a green appeal and analyzes whether consumers' corporate evaluations mediate their effect on purchase intention. Study 2 tests the moderating influence of company size, comparing large companies with greater resource availability with smaller companies. Furthermore, the second study includes a non-green empowerment ad, which also stresses that consumers can influence companies by purchase decisions but without referring to the environmental attribute. It aims to test whether the pure customer focus is more efficient than eco-advertising or if environmental elements provide an additional benefit.

2. Theoretical foundation and hypotheses

2.1 The role of consumer empowerment in green consumption

Power is defined as the capacity to control one's own (but also others') resources or outcomes (Keltner *et al.*, 2003). Therefore, *consumer empowerment* refers to signaling or implementing the process of transferring control over specific corporate activities or resources to the consumer (Fuchs *et al.*, 2010). An empowered person is more optimistic and active than one who feels less powerful (Anderson and Galinsky, 2006). Moreover, a "can-do" state of

mind is achieved through empowerment, and it fosters behavioral actions (Pierce *et al.*, 2003). An individual who feels more powerful is likely to make a buying decision or to buy a higher quantity (Galinsky *et al.*, 2003; Rucker *et al.*, 2012). For instance, when consumers are invited to select which products are marketed, the product demand increases (Fuchs *et al.*, 2010). Similar effects occur when consumers are actively involved in product co-creation processes (Fuchs and Schreier, 2010). To date, however, little research addresses how consumers can be put into this empowered state during a purchase decision in an easily implementable and time-efficient way. Advertising messages could be a useful tool for this.

Most sustainable product marketing employs classic green appeals, which are aimed at making consumers aware of their personal impact on the environment. Green appeals can refer, for instance, to the positive consequences of engaging in an eco-friendly behavior or to the negative consequences (gain- vs. loss-framed messages; e.g., White *et al.*, 2011a). However, in both cases, these appeals only direct consumers' attention to their impact on the environment (e.g., how they can reduce emissions or conserve natural resources; Hartikainen *et al.*, 2014; Ramirez *et al.*, 2015), ignoring the impact that consumers can have on the companies that create the products. Apart from consumers' environmental impact directly related to the eco-friendly product purchased, consumer purchase choices can also shape the company's decisions on product offerings or production manners (generally or specifically with regard to eco-friendly operations; e.g., Buerke et al. 2017).

Therefore, we propose a new form of advertising herein: A *green empowerment ad* identifies customer demand as the major driver of companies' decisions to become green and offer more eco-friendly products, shifting power to the consumer. In light of the positive effects of consumer power, as discussed in the preceding paragraphs (e.g., Anderson and Galinsky 2006; Fuchs et al. 2010; Rucker et al. 2012), green empowerment elements could improve corporate perceptions and also increase green purchase intentions.

Of course, this empowerment tactic via messages can also be applied without focusing on environmental aspects, only making consumers aware of their power over a company's offer. Such a non-green empowerment ad only stresses customer needs, ignoring the sustainability of the product, which can be an important driver for purchasing decisions (Nilssen *et al.*, 2019). In this respect, the green empowerment ad might be more promising than non-green empowerment or green appeals, considering it addresses both customer orientation and sustainability.

2.2 The effect of green empowerment ad on corporate associations

Most existing studies on green advertising focus on their effect on consumers' evaluation of the ad or the advertised product, such as consumer attitudes to the ad (Jiménez and Yang, 2010), the credibility of the ad (Jäger and Weber, 2020), or emotional responses (Amatulli *et al.*, 2017) as antecedents of consumer behavior. In contrast, the effect of green advertising on corporate associations is examined less often, although consumers' responses are significantly determined by what they know about a company (Mohr *et al.*, 2001). The perception of a supplier's corporate social or environmental engagement increases the corporate evaluation, which in turn triggers product evaluation (e.g., responses to sustainability efforts in (Hofenk *et al.*, 2019); cause-related marketing in (Howie *et al.*, 2018). Moreover, perceived corporate reputation positively affects consumer trust and therefore purchase intention (Ali *et al.*, 2015).

A green empowerment ad is focused more on the company than on the product and is therefore likely to influence corporate associations. According to Walsh and Beatty (2007) customer orientation and environmental responsibility represent two major aspects of corporate reputation. With a green empowerment ad, a company signals that it is willing to (1) react to customer wishes and (2) intensify green offerings/operations, thereby triggering both corporate associations. Further, improved corporate associations might positively influence purchase intentions. In the following sections, we discuss in further detail how green empowerment ads affect these corporate associations and thus purchase intentions compared with other ad types.

2.2.1 Customer orientation

A customer-oriented firm positions the customer as the focal point of strategic planning and execution and prioritizes its resources to meet customers' current and future needs (Brady and Cronin, 2001; Deshpandé *et al.*, 1999). Previous studies show that consumers' perceptions of a companies' customer orientation (CO) are actively manageable (Ruth and York, 2004).

Consumer empowerment in the process of new product development is shown to increase the level of perceived CO (Fuchs et al. 2011). In contrast, a green appeal that is purely focused on the product's environmental benefits (instead of the product quality) can even lead to reduced perceptions of product quality, as consumers might infer that the company diverts resources to reach environmental goals (Newman *et al.*, 2014). Hence, product-focused green appeals may give consumers the impression that the company prioritizes not the consumer but the environment. Therefore, we expect that an empowerment ad has a positive effect on perceived CO but that green appeals do not:

H1: (a) Green and (b) non-green empowerment ads have a larger positive effect on perceived CO than green appeals.

Literature suggests that this greater perceived CO should further lead to more positive consumer reactions such as buying intention for products (Brady and Cronin, 2001). Therefore, we hypothesize that perceived CO mediates the effect of an empowerment ad on purchase intention:

H2: The positive effect of (a) green and (b) non-green empowerment ads on green purchase intention is mediated by perceived CO.

2.2.2 Corporate environmental responsibility

Previous studies report positive effects of corporate social responsibility on customer attitudes and purchase intentions (van Doorn et al., 2017; Grimmer and Bingham, 2013; Parsa et al., 2015; Li et al., 2017; Bianchi et al., 2019). However, the perception of corporate environmental responsibility (CER) not only depends on the company's actual performance but can also be influenced by its communication method (Ruth and York, 2004).

Green appeals can be a simple method to increase green purchase intentions as well as perceived CER. Nevertheless, these are also prone to the suspicion of "greenwashing," leading to a credibility problem (Cheng et al., 2020). People are more likely to accept a decision aid, for example, in the form of a message, if its inner working processes are explained (Herlocker et al., 2000). For instance, (Pomering and Johnson, 2009) suggest that consumer skepticism can be reduced (and corporate reputation increased) if the firm explicitly declares the social topics in which it engages. The green empowerment ad shows that the company is aware of environmental challenges, is ready to take action, and does so in response to consumers requiring it. Therefore, green empowerment ads should be able to increase the perceived CER to a similar extent as green appeals:

H3: Green empowerment has (a) a similar positive effect on perceived CER as green appeals but (b) a larger effect compared with non-green empowerment.

H4: The positive effect of green empowerment on green purchase intention is mediated by perceived CER.

As hypothesized in H2 and H4, we expect that the effect of green empowerment on purchase intention to be mediated by two factors, CO and CER. In contrast, we expect a positive effect of green appeals on only CER, not CO. In addition, a non-green empowerment ad should only affect one of these mediating variables (CO but not CER). Extant research indicates that a

blended advertising approach combining both egoistic and altruistic appeals produces more favorable responses, for instance, compared with an appeal solely based on egoistic appeals (Kareklas et al., 2014). Therefore, we assume that the two effects of green empowerment add up and generate a larger effect on purchase intention than a single strategy focusing only on ecological benefits (green appeal) or customer's self-benefits (non-green empowerment). Following this argumentation, we propose:

H5: Green empowerment ads more effectively enhance green purchase intention than (a) green appeals and (b) non-green empowerment ads.

2.3 Organizational resources and CER

Adapting and investing in green production processes might require certain resources. However, especially small and medium-sized enterprises (SMEs) face restrictions in terms of resources and expertise (Wu, 2017). Compared with SMEs, larger companies have more available capacities to deal with risks and unpredictability associated with voluntary environmental activities (Greening and Gray, 1994). Therefore, research shows strong evidence that available resources and firm size are significant predictors of firm environmental performance (Elsayed, 2006), which seems to be reflected in consumer perceptions, as the company's size and financial performance positively affect perceived corporate social reputation (Lu *et al.*, 2015). We assume that the amount of available resources also determines whether consumers perceive the company as able to adapt to their green demands. Consumers can only feel truly empowered to affect corporate decisions on further green investments if they believe the company's resource situation realistically allows for making these investments. Therefore, to investigate whether the level of available resources moderates how consumers perceive an ad for a green product, we hypothesize the following:

H6: Perceived corporate resources moderate the effect of green empowerment on perceived CER.

Figure 6 summarizes the hypothesized effects of three experimental ad types (green empowerment, non-green or general empowerment, and green appeal) in a conceptual model.
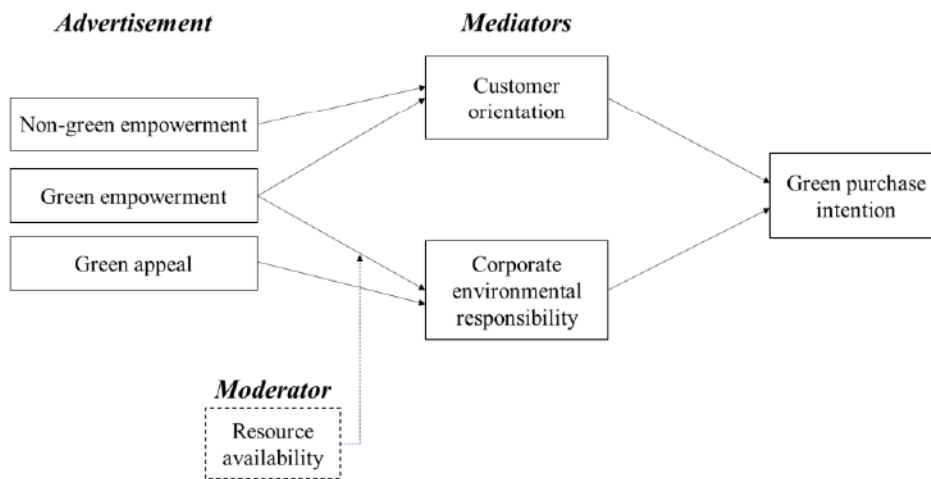
Figure 6: Conceptual model tested within this paper

3. Study 1: Green empowerment ad versus green appeal

Study 1 served to test the effectiveness of a green empowerment ad against a green appeal as well as the mediation of the effect via company evaluations. We then further compared both ads with a control group to assess the extent to which they can improve consumers' company ratings and purchase intention.

3.1 Method

Stimuli. The green empowerment ad was designed to indicate the impact of consumers' buying decision on the green product offering and production manners of the company. The ad explicitly addressed consumer buying power and its effect on changing companies and the environment: *"Use your power to move green production: By buying environment-friendly products, you can set a signal that you require us to offer more green products and to intensify environment-friendly operations. Every consumer can actively exercise buying power to influence the supplier and therefore the environment."* The green appeal, in contrast, focused on the consumers' positive environmental impact by purchasing the product: *"Help improve the environment: By buying environment-friendly products, you can make a step forward to reduce pollutants and to improve environmental quality. Every consumer can take care of the environment."* The control group received neutral information not related to any environmental effects (see Appendix A.3). We conducted single interviews with six Chinese graduate students to optimize the wording of the stimuli.

Procedure. We tested our hypotheses H1a, H2a, H3a, H4, and H5a in a survey-based online experiment with a between-subjects design (*ad type:* green empowerment vs. green appeal vs. control). We randomly assigned participants to one of the experimental conditions. They were asked to imagine they were shopping for organic rice in an online marketplace and received

some information about the product. Then, participants were directed to carefully read an advertisement message containing the experimental stimulus, which appeared for at least 10 seconds. To recall the ad, participants were asked to write down the main ideas of the ad. The survey captured participants' attitudes toward the ad and product perceptions. Next, we measured perceived power as a manipulation check, followed by the CO and CER perceptions of the company. Then, participants indicated their purchase intention for the product. The last part of the survey captured purchase habits in daily life, message familiarity and comprehensibility, and sociodemographics.

Measures. Multi-item scales have higher reliability and validity (Diamantopoulos *et al.*, 2012; Sarstedt and Wilczynski, 2009); therefore, we used established multi-item scales in our questionnaire: attitude toward the ad (three items; Severn *et al.*, 1990), product perception (Grant *et al.*, 2004), perceived power (Fuchs *et al.*, 2010; Spreitzer, 1995), CO (Blocker *et al.*, 2011; Walsh and Beatty, 2007), CER (Turker, 2009; Walsh and Beatty, 2007), purchase intention (Dodds *et al.*, 1991), and social desirability (Crowne and Marlowe, 1960). Further, we used self-developed single-item-measures for measuring purchase habits (online and green purchase frequency), message familiarity, and comprehensibility as control variables (see Appendix A.4 for a full list of items and related constructs). The questionnaire was composed in English and translated into Mandarin Chinese using the iterative approach, which strives for conceptual equivalence rather than literal translation (Douglas and Craig, 2007). All constructs showed satisfactory reliability levels (Cronbach's alpha > 0.70) as well as high factor loadings (> 0.70; Appendix A.4), except for the social desirability scale (Cronbach's alpha = 0.55), which is nonetheless within the Marlowe-Crowne Scale acceptable range of between 0.50 and 0.75 (Loo and Loewen, 2004).

Sample. In total, we recruited 311 Chinese consumers through an online survey platform (Weidiaocha.com). Participants received a monetary reward as an incentive. We excluded 20 respondents who answered the questionnaire more than two times faster than the average respondent did, as an indicator for cases containing meaningless data (Leiner, 2013). This resulted in a final sample of 291 respondents (sample size per group: $n_{GreenPower} = 103$, $n_{GreenAppeal} = 96$, $n_{Control} = 92$), with 65% female respondents and age ranging between 16 and 55 years ($M = 28.0$ years, $SD = 6.32$ years). The majority (85%) held a university degree.

Manipulation check and descriptive statistics. The manipulation check confirmed that respondents experienced a higher degree of power over the company's decisions after reading the green empowerment ad than after reading both the green appeal and control group ads ($M_{GreenPower} = 4.96$, $M_{GreenAppeal} = 4.24$, $M_{Control} = 3.94$, $F(2, 288) = 13.37$, $p < 0.001$). In addition,

results were not confounded by group differences on nonmanipulated variables: Message familiarity did not differ significantly across the three groups ($M_{GreenPower}$ = 4.81, $M_{GreenAppeal}$ = 4.59, $M_{Control}$ = 4.52; $F(2, 288)$ = 1.15, p = 0.31), and the same applies to ad comprehensibility (low mean scores indicating high comprehensibility: $M_{GreenPower}$ = 3.14, $M_{GreenAppeal}$ = 2.72, $M_{Control}$ = 2.97; $F(2, 288)$ = 1.81, p = 0.16). However, attitudes toward the ads differ: Participants evaluated the green empowerment advertisement and the green appeal more positively than the control group ad. We observed no significant differences between the green empowerment ad and the green appeal: $M_{GreenPower}$ = 5.06, $M_{GreenAppeal}$ = 5.01, $M_{Control}$ = 4.42; $F(2, 288)$ = 6.67, p < 0.01. Further, participants evaluate the product better in the empowerment group than in the control group ($M_{GreenPower}$ = 5.43, $M_{GreenAppeal}$ = 5.22, $M_{Control}$ = 4.88; $F(2, 288)$ = 4.43, p = 0.01).

3.2 Results

3.2.1 Effects of green empowerment on corporate evaluations and purchase intention

We performed three analyses of variance (ANOVAs) with post hoc tests to test the effect of ad type on CO, CER, and purchase intention (see Table 5). We found significant main effects of the ad type on all outcome variables. Participants indicated higher CO after reading the green empowerment ad than after the green appeal and the control group ad (in support of H1a). For perceived environmental responsibility, we found a significant difference between the green empowerment ad and the control group ad but not to the green appeal (confirming H3a). The green appeal also significantly increases environmental responsibility compared with the control group ad. We confirmed that the green empowerment ad has a more positive effect on purchase intention than the other two groups, in support of H5a. The green appeal did not significantly improve CO or purchase intention (compared with the control group).

Table 5: Effects of ad type on CO, CER and purchase intention (ANOVAs)

M		Sign. group differences	*F*	Hypothesis
CO				
Green power:	5.46	Green power > Green appeal/Control	8.57***	H1a: ✓
Green appeal:	4.95	Green appeal > Control		
Control:	4.80			
CER				
Green power:	5.53	Green power > Control	13.99***	H3a: ✓
Green appeal:	5.27	Green appeal > Control		
Control:	4.70			
Purchase intention				
Green power:	5.43	Green power > Green appeal/Control	8.83***	H5a: ✓
Green appeal:	4.82			
Control:	4.65			

Notes: † p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001; ANOVAs with Scheffé post hoc tests (p < 0.05); CO = customer orientation; CER = corporate environmental responsibility.

3.2.2 Mediation effects of corporate evaluations

To better understand the direct and indirect effects of ad type on green purchase intention, we conducted a parallel mediation analysis using PROCESS model 4 (95% percentile bootstrap confidence intervals with 5,000 resamples; Hayes, 2018). We added purchase habits and social desirability to the model as covariates.

The green empowerment ad positively affects both CO and CER (b = 0.62 / 0.80, p < 0.001; Table 6). In contrast, the green appeal only drives CER (b = 0.61, p < 0.001; Table 6), again confirming H1a and H3a. Our data show that CER has the largest significant effect on purchase intention (b = 0.39, p < 0.001), followed by CO (b = 0.21, p < 0.05). From the two ads, only green empowerment has a marginally significant positive effect on purchase intention (b = 0.29, p < 0.10; confirming H5a). In line with Bissing-Olson et al. (2016) and Milfont et al. (2006), we considered purchase habits and social desirability as well, finding that purchase habits including online purchase and green purchase frequency also lead to higher purchase intention, while social desirability did not affect any of the variables.

Table 6: Regression coefficients and significance levels for the parallel mediation analysis

	CO		CER		Purchase Intention	
Green power	0.62	***	0.80	***	0.29	†
	(0.16)		(0.15)		(0.17)	
Green appeal	0.19		0.61	***	–0.02	
	(0.16)		(0.15)		(0.17)	
CO					0.21	*
					(0.10)	
CER					0.39	***
					(0.09)	
Online purchase	0.15	***	0.12	**	0.17	***
	(0.04)		(0.04)		(0.04)	
Green purchase	0.22	***	0.23	***	0.20	**
	(0.05)		(0.05)		(0.06)	
Social desirability	0.15		0.15		–0.00	
	(0.11)		(0.12)		(0.11)	
Constant	2.61	***	2.60	***	–0.16	
	(0.40)		(0.40)		(0.38)	
R²	0.27		0.29		0.56	
F	18.28		22.77		55.33	

Notes: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; heteroscedasticity-consistent standard error estimators (HC3) in parentheses; baseline: control group; CO = customer orientation; CER = corporate environmental responsibility.

The mediation analysis confirms the indirect effect of the green empowerment ad through both mediators, CO and CER. As a mediated effect exists via CO (b = 0.13, p < 0.05; confirming H2a) and CER (b = 0.31, p < 0.05; Table 7 ; confirming H4), as well as a marginally significant

direct effect on purchase intention (see Table 6), we can confirm a partially mediated effect (Zhao et al., 2010). The effect of the green appeal is fully mediated by CER. Further, the total effect of the green empowerment on purchase intention is highly significant (b = 0.73, p < 0.001; total effect = direct effect + indirect effects via CO and CER; see (Hayes, 2018), whereas the green appeal has no significant total effect (b = 0.26, p > 0.10), which lends further support to H5a.

Table 7: Confidence intervals for the mediation analysis (relative indirect effects on purchase intention)

	Indirect effects via CO			Indirect effects via CER		
	b	LB	UB	*b*	LB	UB
Green power	0.13*	0.01	0.29	0.31*	0.16	0.51
Green appeal	0.04	–0.02	0.14	0.24*	0.10	0.42
Hypothesis	H3: ✔			H5: ✔		

Notes: * significant (percentile 95% CI, n = 5,000 bootstrap samples; LB = lower bound, UB = upper bound); CO = customer orientation; CER = corporate environmental responsibility.

In summary, we can conclude from Study 1 that the green empowerment ad consistently outperforms both the control group and the green appeal. Both green empowerment and green appeal increase perceived environmental responsibility of the company, but the green empowerment leads to significantly greater perceptions of CO and affects purchase intention. Study 1 shows the effects of green empowerment on consumer response variables and significant mediators. Study 2 focuses on the moderating effect of corporate resources and extends previous experimental conditions with a general, non-green empowerment ad.

4. Study 2: Green and non-green empowerment and the moderating effect of perceived corporate resources

Study 1 showed that CER is an important mediator driving purchase intentions. As expected, we also found the CER perceptions were increased as much by the green empowerment ad as by the green appeal. The former performed better because it also increased CO and the positive effects via CO and CER were additive. We proposed that this addition of effects should lead to an advantage over not only green appeals but also non-green empowerment ads only focusing on a company's CO (see H3b and H5b). Therefore, we conducted a second study aiming to (a) replicate the effect of a green empowerment ad in a different sample, (b) test both green and non-green empowerment ads, and (c) examine potential differences for companies with high vs. low resource availability.

4.1 Method

We employed a 4 (ad type: green empowerment vs. non-green empowerment vs. green appeal vs. control) × 3 (company type: high resources vs. low resources vs. control) full factorial between-subjects design.

Stimuli and procedure. First, respondents saw the same product information as in Study 1. Then, they viewed the Study 1 stimuli for the green empowerment ad, the green appeal ad, and the control group. We added a non-green empowerment ad, which emphasizes the consumers' power to influence suppliers' production without explicitly mentioning eco-friendliness: "Use your power to move production: By making product choices, you can set a signal that you require us to offer more of the chosen products and to intensify related operations. Every consumer can actively exercise buying power to influence the supplier." Regarding the company size, two groups received information about the company's high vs. low resource availability through indicators such as turnover, number of employees, and technological advancement (see Appendix A.3), while the control group received neutral information. A pretest (n = 215) confirmed that information about the companies' size (turnover: 91.4b Yuan/ 914,000 Yuan; number of employees: 323,000/ 30) or technological advancement ("highly innovative technologies" vs. "technologies of long tradition") is sufficient to influence perceived resource availability: Large companies with high technological advancement were viewed as having the highest level of perceived resource availability (M = 6.23), followed by large companies with low technological advancement (M = 6.06). Small companies were perceived to have significantly fewer available resources ($M_{high-tech}$ = 3.89; $M_{low-tech}$ = 3.48). Large companies differed significantly from small companies in perceived resource availability (F(3, 211) = 75.97; p < 0.001) and perceived company size (F(3, 211) = 193.25; p < 0.001). For the main study, we employed the two company descriptions which differed most (large companies with high technological advancement; small companies with low technological advancement).

Measures. We applied the same measures as in Study 1 and used self-developed manipulation checks for perceived resource availability (single-item for company size, 2 items for resource availability). We added a measure of the perception of product quality as a third item for product evaluation (Grant et al., 2004). All constructs showed satisfactory reliability levels (Cronbach's alpha > 0.80) as well as high factor loadings (> 0.70; Appendix A.4), except for the social desirability scale (Cronbach's alpha = 0.55), which is still an acceptable rate according to Loo and Loewen (2004).

Sample. We collected data from 530 Chinese consumers, recruited through the same online survey platform used in Study 1 (Weidiaocha.com). Participants received a monetary reward as incentive. We excluded 73 respondents who did not pass an attention check requiring a certain answer (Paas et al., 2018), resulting in a sample of 457 respondents. The sample consists of 66.3% female respondents (average age: M = 27.32 years, SD = 6.4 years). Participants' education level was high: 87.5% held a university degree.

Manipulation checks and descriptive statistics. The manipulation check confirms that respondents experienced a higher degree of power over the company's decisions after reading the green/non-green empowerment ads compared with both the green appeal and control group ad ($M_{GreenPower}$ = 4.82, M_{Power} = 4.74, $M_{GreenAppeal}$ = 4.07, $M_{Control}$ = 3.90, F(3, 453) = 10.98, p < 0.001). Further, company size and resource availability reached highest scores in the high resource condition, followed by the control and the low-resource group, with significant differences between all three groups (company size: M_{High} = 5.98, M_{Low} = 3.68, $M_{Control}$ = 5.13, F(2, 454) = 105.74, p < 0.001; resource availability: M_{High} = 5.71, M_{Low} = 4.28, $M_{Control}$ = 5.19, F(2, 454) = 43.06, p < 0.001). As in Study 1, we find that the attitude toward the green appeal is more positive than toward the control group ad, but we observed no significant differences between the other three ads: $M_{GreenPower}$ = 5.21, M_{Power} = 5.05, $M_{GreenAppeal}$ = 5.32, $M_{Control}$ = 4.43, F(3, 453) = 8.32, p < 0.001. Participants evaluated product quality better in the empowerment group than in the control group ($M_{GreenPower}$ = 5.54, M_{Power} = 5.48, $M_{GreenAppeal}$ = 5.42, $M_{Control}$ = 5.04; F(3, 453) = 3.67, p = 0.01).

4.2 Results

4.2.1 Effects of green empowerment on corporate evaluations and purchase intention

We applied two-way ANOVAs to test the effects of ad type and company resources on CO, CER, and purchase intention. We observed significant main effects of both the ad type and resource availability on CO (see Table 8). Both empowerment ads (M_{Green} = 5.59, $M_{Non-Green}$ = 5.78) significantly increase CO compared with the green appeal (M_{GA} = 5.13; see Table 8). The effect of the empowerment ads is significantly larger compared with the green appeal, which confirms H1a (as in Study 1) and H1b. In contrast, low company resources have a negative effect, significantly reducing the CO perception compared with the control group (M_{Low} = 5.16 vs. $M_{Control}$ = 5.62; see Table 8 and Appendix A.5).

For CER, we find a significant main effect of ad type and an interaction effect with company resources (see Table 8). As expected (H3a and H3b), the green empowerment increases CER compared with the control and the non-green empowerment ads, but we observed no significant

difference compared with the green appeal. Hence, results from Study 1 regarding the effect of green empowerment on CER (H3a) are replicated. Further, the significant interaction effect confirms H6.

Table 8: Effects of ad type and company resources on CO, CER, and purchase intention (two-way ANOVAs)

	M		Sign. group differences	*F*	Hypothesis
CO					
Ad	Green power:	5.59	Green power > Green appeal	7.26***	H1a: ✔
	Power:	5.78	Power > Green appeal/ Control		H1b: ✔
	Green appeal:	5.13			
	Control:	5.20			
Resources	Control:	5.62	Control > Low	4.90**	
	High:	5.42			
	Low:	5.16			
Ad* Resources				0.60	
CER					
Ad	Green power:	5.44	Green power > Power/ Control	16.49***	H3a: ✔
	Power:	4.80	Green appeal > Power/ Control		H3b: ✔
	Green appeal:	5.76			
	Control:	4.68			
Resources	Control:	5.29	--	3.01†	
	High:	5.18			
	Low:	4.98			
Ad* Resources				2.29*	H6: ✔
Purchase intention					
Ad	Green power:	5.31	Green power > Control†	2.55†	H5a: ×
	Power:	5.12			H5b: ×
	Green appeal:	4.95			
	Control:	4.77			
Resources	Control:	5.21	Control/ High > Low	4.17*	
	High:	5.17			
	Low:	4.73			
Ad* Resources				0.37	

Notes: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; two-way ANOVAs with Scheffé post hoc tests ($p < 0.05$); CO = customer orientation; CER = corporate environmental responsibility.

A simple main effects analysis shows that the effect of the green empowerment on CER is significantly larger in the high resource group (compared with the low resource group, $p < 0.05$; $F(2, 445) = 4.67$, $p < 0.05$; Figure 7), but not compared with the control group. In contrast, the green appeal has the same effect for all resource groups ($F(2, 445) = 0.05$, $p > 0.10$). Further, the simple main effects analysis shows that for high-resource companies there are significant differences between ad types ($F(3, 445) = 8.48$, $p < 0.001$). Both green empowerment ad and green appeal perform well: CER was rated significantly higher for these ad types than the non-green empowerment ad ($p < 0.05$) and the control group ($p < 0.001$). In contrast, for low-resources companies, the green appeal is most effective and leads to significantly higher CER ratings than all other ads ($F(3, 445) = 7.30$, $p < 0.001$; green appeal vs. green/non-green

empowerment: p < 0.05, green appeal vs. control: p < 0.001; Figure 7). Thus, the green appeal improves CER independently from the company's resources, whereas the green empowerment effect disappears in the low resource group. Regarding purchase intention, we find a marginally significant direct effect of the ad type and a significant effect of company resources but no interaction (see Table 8). The green empowerment ad increases purchase intention marginally significantly compared with the control group. Descriptively, we observed differences compared with the non-green empowerment ad and the green appeal, but they are too small to approach significance. Therefore, H5a and H5b cannot be confirmed in Study 2. In general, consumers are less willing to buy from smaller companies with lower resource availability (see Table 8 and Appendix A.5).
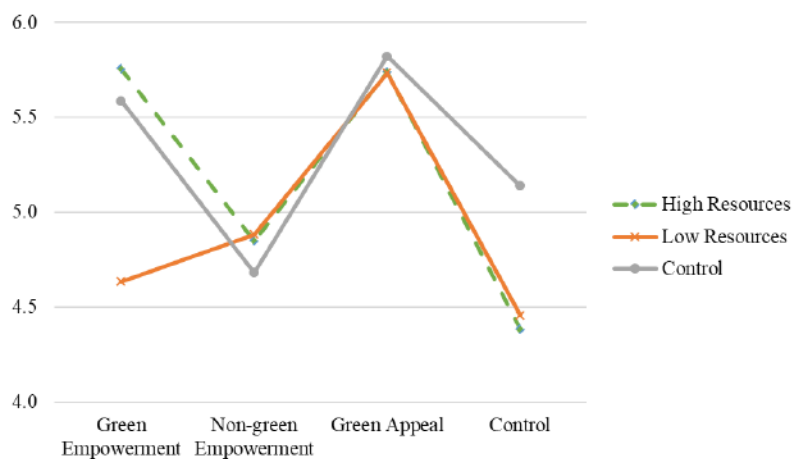
Figure 7: Means for CER in the different resource x advertisement conditions

Notes: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; two-way ANOVAs with Scheffé post hoc tests ($p < 0.05$); CO = customer orientation; CER = corporate environmental responsibility.

4.2.2 Mediation effects of corporate evaluations

The results from a parallel mediation analysis are largely comparable to Study 1. The green empowerment ad influences both CO (b = 0.36, p < 0.05) and CER (b = 0.70, p < 0.001; Table 9). The non-green empowerment ad only increases CO (b = 0.54, p < 0.001), and the green appeal only increases CER (b = 1.19, p < 0.001; Table 9). Again, both CO and CER have significant positive effects on purchase intention (b = 0.33/ 0.40, p < 0.001), while the ads have no significant direct influence on purchase intention. Further, the effect of the green appeal is mediated by CER (b = 0.47; Table 10), and the effect of the green empowerment is fully mediated by the two mediators, CO and CER (b = 0.12/ 0.28; Table 10; Zhao, Lynch, & Chen, 2010), which confirms H2a and H4 (similar to Study 1). Moreover, CO mediates the non-green empowerment ad effect (b = 0.17; Table 10), supporting H2b.

The total effect of green empowerment ad on purchase intention is significant (b = 0.47, p < 0.01; total effect = direct effect + indirect effects via CO and CER; see Hayes, 2017) and slightly larger compared with the green appeal (b = 0.37, p < 0.5) and the non-green empowerment ad (b = 0.33, p < 0.5).

Table 9: Regression coefficients and significance levels for the parallel mediation analysis

	CO		CER		Purchase Intention	
Green power	0.36 *		0.70	***	0.08	
	(0.15)		(0.16)		(14)	
Power	0.54 ***		0.04		0.15	
	(0.14)		(0.18)		(0.13)	
Green appeal	0.03		1.19	***	–0.12	
	(0.14)		(0.16)		(0.14)	
CO					0.33	***
					(0.06)	
CER					0.40	***
					(0.06)	
Online purchase	0.05 †		0.15	***	0.10	***
	(0.03)		(0.04)		(0.03)	
Green purchase	0.26 ***		0.18	***	0.20	***
	(0.04)		(0.05)		(0.04)	
Social desirability	0.38 ***		0.36	***	0.07	
	(0.08)		(0.10)		(0.07)	
Constant	2.15 ***		1.77	***	–0.55	†
	(0.31)		(0.39)		(0.30)	
R^2	0.27		0.27		0.59	
F	28.22		27.57		97.19	

Notes: $^\dagger p < 0.10$, $* p < 0.05$, $** p < 0.01$, $*** p < 0.001$; heteroscedasticity-consistent standard error estimators (HC3) in parentheses; baseline: control group; CO = customer orientation; CER = corporate environmental responsibility.

Table 10: Confidence intervals for the mediation analysis (relative indirect effects on purchase intention)

	Indirect effects via CO				Indirect effects via CER			
	b	LB	UB	Hypo-thesis	b	LB	UB	Hypo-thesis
Green power	0.12*	0.02	0.24	H2a: ✔	0.28*	0.14	0.44	H4: ✔
Power	0.17*	0.07	0.30	H2b: ✔	0.01	–0.13	0.15	
Green appeal	0.01	–0.08	0.10		0.47*	0.31	0.65	

Notes: * significant (percentile 95% CI, n = 5,000 bootstrap samples; LB = lower bound, UB = upper bound); CO = customer orientation; CER = corporate environmental responsibility.

4.2.3. Moderated mediation by company resources

Previous results indicate an interaction of the ad type with company resources to produce an effect on CER. To determine whether the mediation effects are moderated, we additionally conducted a moderated mediation analysis using PROCESS model 7 (95% percentile bootstrap confidence intervals with 5,000 resamples; (Hayes, 2018). The omnibus test confirms that a significant interaction occurs between Ad*Resource for the effect on CER ($R^2_{change} = 0.03$; p < 0.01; in line with H6), while no interaction occurs between Ad*Resource for the effect on CO

($R^2_{change} = 0.01$; $p > 0.10$). Specifically, for the effect on CER, there are three positive, significant interaction terms: Green Power*High Resources (b = 0.80; $p < 0.05$), Power*Low Resources (b = 0.96; $p < 0.05$), and Green Appeal*Low Resources (b = 1.01; $p < 0.01$).

Table 11 shows that the mediation effects via CER differ in the high versus low resources group and the control group without company information. The mediation effect of the green power ad is only significant in the high resources group (b = 0.47). The difference between conditional indirect effects is significant as well (high resources vs. control; IMM = 0.32; $p < 0.05$; Table 11). Further, the analysis shows significant mediation effects of the green appeal in all groups, ranging from b = 0.27 (control group) to b = 0.67 (low resources; Table 11). The mediation effect is significantly larger in the low resources group than in the control group (IMM = 0.39; $p < 0.05$; Table 11). In contrast, the mediation effects of the non-green empowerment ad via CER are small and remain nonsignificant for all groups. Overall, the analysis supports the conclusion that the mediation effects of CER are moderated by the resource conditions.

Table 11: Relative conditional indirect effects of ad type (moderated mediation analysis)

| | Indirect effect via CER | | |
	Green Empowerment Ad	Non-Green Empowerment Ad	Green Appeal
Control	0.15	-0.20	0.27*
High Resources	0.47*	0.08	0.48*
Low Resources	0.12	0.18	0.67*
Index of moderated mediation (I$_{MM}$)			
I$_{MM}$: High (vs. Control)	0.32*	0.28	0.20
I$_{MM}$: Low (vs. Control)	-0.02	0.38*	0.39*

Notes: * significant (percentile 95% CI; n = 5,000 bootstrap samples); CER = corporate environmental responsibility.

In summary, Study 2 shows that a green empowerment ad outperforms both a non-green empowerment ad and a green appeal, as it is able to simultaneously increase consumers' perceptions of CO and CER, which is in line with Study 1. In addition, Study 2 shows that company resources also influence ad effectiveness: The effect of the green empowerment ad on CER is diminished for small companies with low resource availability.

5. Discussion

5.1 Theoretical and managerial implications

In two experimental studies, we investigate a new approach for advertising eco-friendly products that effectively increases consumers' beliefs about their power over the company's (pro-environmental) activities. Empowered individuals show improved perceptions of the company's CO and CER. In contrast, consumers do not feel empowered by a green appeal, which is often used in advertising practice, and perceptions of CO are not enhanced.

Furthermore, a non-green empowerment ad, though it increases consumers' power beliefs, does not contribute to the perception of environmental responsibility. In contrast, a green empowerment ad achieves a simultaneous, complementary effect on two important dimensions of corporate evaluation, CO and CER, which in turn drive purchase intentions. Thus, both green appeals and non-green empowerment ads are less effective because they can only impact a single dimension.

This research extends the existing literature on green advertising by showing the applicability of empowerment elements in the communication for environmentally sustainable products. Findings support the results of previous studies on consumer empowerment in the product design process (Fuchs *et al.*, 2010), in that empowerment has positive effects on CO and purchase intention. The present article emphasizes the importance of corporate evaluations as mediators between green advertisements and consumers' purchase intentions, supplementing extant research that focuses on consumers' product evaluations (Grimmer and Woolley, 2012; Hartikainen *et al.*, 2014; Ramirez *et al.*, 2015) and their ability to perform a certain behavior (White et al. 2011).

Further, we show that perceived CO as a buyer's benefit and perceived CER as a public benefit can coexist without negative interference. This finding indicates the evaluation mechanism in individuals' minds that strives to optimize several factors of a supplier's performance at the same time, for which the needs for corporate resources could be in conflict. It is likely that green appeals signal to the consumer that a company uses most of its attention and resources to become more eco-friendly, while neglecting customer needs. Interestingly, the CO focus of the green empowerment ad might also alleviate negative connotations of other, purely self-benefit-oriented appeals. For instance, (Bolderdijk *et al.*, 2013) show that consumers prefer to see themselves as green rather than greedy; hence, economic incentives ("save money") can backfire in environmental campaigns. In contrast, consumers' expectation that companies should be customer oriented seems more socially acceptable.

Newman et al. (2014) argue that explicitly emphasizing a product's environmental benefits negatively affects product quality evaluation because consumers perceive that resources are deducted from product quality to enhance sustainability. We could not confirm this. In both studies, the product ratings did not differ significantly between the three investigated ad types, although we acknowledge results probably depend on the advertised product category. Newman et al. (2014) examined ads for cleaning products, whose primary product property is a strong cleaning performance. Luchs *et al.* (2010) show that consumers associate sustainable products with gentleness-related attributes, so if the primary product property is strength-related (e.g.,

cleaning performance), nonsustainable products might be preferred. Sustainable food consumption is, however, mainly driven by health and taste perceptions (Hughner *et al.*, 2007), which fit the "gentleness" associated with sustainability in general (Luchs *et al.*, 2010). Therefore, emphasizing sustainable product attributes probably does not have a negative effect on the perceived product quality here. However, a pure focus on environmental aspects does not seem advisable, supporting Newman et al.'s (2014) recommendations. The focus of the consumer in classic green appeals seems to be entirely directed toward sustainability as a buying motive, whereby other potentially important factors such as the company's CO no longer have any influence. The present study proves CO to be a decisive additional driver for purchasing decisions that should be addressed in advertisements.

Concerning companies' resources, we find that consumers tend to consider low-source or small companies as less customer-oriented and are less likely to buy their products, in line with Lu *et al.* (2015). Furthermore, small companies benefit less from green empowerment ads, as the perception of CER is not improved. The promise of adapting to green demand is associated with significant investment on the part of the company. Consumers seem to share the belief that SMEs are more restricted in terms of resources and expertise and, thus, have more difficulty becoming environmentally friendly (Wu 2017). In contrast, green appeals do not focus on a company's proposed environmental investments in the future (when it is unsure whether they can be achieved) but on the current environmental benefit of the product. Therefore, green appeals affect CER perceptions in the same way, for both high- and low- resource companies.

For managers, we recommend that a small company should use green empowerment ads only if it can credibly signal to customers that it is actually able to manage these changes. Large companies can easily capitalize on their size as well as highlight their level of resources and expertise to further support the effectiveness of green empowerment ads. With respect to the cultural dimension, our study took place in China, which is representative of a centralized system with a higher level of power distance (Spencer-Oatey, 1997) and shows that the suggested empowerment approach performs well, even if stronger beliefs in hierarchy exist. For more egalitarian contexts (e.g., Western countries; Schwartz, 2007), an empowerment approach could possibly reach even better performance, as individuals likely see more balanced power relations with companies as desirable. Future research should investigate this possibility, as we discuss further in the "Limitations and future research" section.

Overall, our results suggest that companies should apply the principles of a green empowerment ad, as a companies' perceived CO and CER can be triggered simultaneously, which leads to the largest total positive effects on consumers' purchase intentions. Although a

non-green empowerment ad can also affect perceived CO at a similar level, the green version has the potential to additionally contribute to image differentiation or the establishment of a green reputation. The possibility of boosting purchase intention based on a green empowerment ad applies across company sizes and resource capacities. However, if the primary goal of smaller companies is to increase perceived CER in specific cases, green appeals serve to achieve this effect.

5.2 Limitations and future research

Several limitations should be addressed in future research. Both studies presented herein deliver results based on survey data, which might be affected by the intention–behavior gap (Sudbury-Riley and Kohlbacher, 2016). In the future, actual behavioral data should be collected to evaluate the practical relevance of the green empowerment approach. Furthermore, people might change their perceptions of power over a company and their evaluations of the company's CO as they have repetitive interactions with it (Park and Reber, 2008). We used fictitious company examples, so results might differ in a more realistic setting with known brands and previous product experience. Overall, future research should uncover the long-term effects of continuous customer-oriented green advertising.

We conducted our study in a Chinese context, which represents specific political and cultural features. Previous studies indicate that the mechanism of how certain beliefs affect Chinese consumers' purchase intentions is comparable to studies in Western countries (Thøgersen and Zhou, 2012). However, future studies should investigate whether potential cross-country differences in people's desire for power and environmental values might affect the effectiveness of green empowerment. In addition, our sample consists of predominantly younger and more-educated people. Older respondents and those with no university degree are necessary to make representative conclusions.

We tested the empowerment ad only for the organic food product category. Future studies should be replicate ours with a wider range of products to identify potential category effects such as product involvement (McDonald *et al.*, 2009; Zhou *et al.*, 2012). The more involved with or committed the consumer is to buying a specific product, the more power he or she would want to influence the product design and offering (Bügel *et al.*, 2011). Further research is required to systematically analyze which product categories would benefit most from empowerment ads. As outlined previously, a green empowerment ad contains a cost-intensive promise (investments in eco-friendly production) and might be primarily associated with a high-resource company. The high performance of combining an empowerment ad with resource

information could be caused by consumer perceived fit of messages (e.g., message-congruency; (Kuipers and La Heij, 2008). Future research should test whether message congruency drives the effects of company resources on advertisement effectiveness. Further, researchers should develop measures achieving the benefit of green empowerment ads for both small and large companies.

References Section D - Article III

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Appendix Section D - Article III

Appendix A.3: Stimuli

Group	Message
Ad type	
Green empowerment	"Use your power to move green production: By buying environment-friendly products, you can send a signal that you require us to offer more green products and to intensify environment-friendly operations. Every consumer can actively exercise buying power to influence the supplier and therefore the environment."
Non-green empowerment (only Study 2)	"Use your power to move production: By making product choices, you can send a signal that you require us to offer more of the chosen products and to intensify related operations. Every consumer can actively exercise buying power to influence the supplier."
Green appeal	"Help improve the environment: By buying environment-friendly products, you can make a step forward to reduce pollutants and to improve environmental quality. Every consumer can take care of the environment."
Control	"The product information comes from the platform."
Company type (only Study 2)	
High resource availability	"Our company reached an annual turnover of 91.4 billion Yuan in 2018. We employ over 323,000 people in total. We apply highly innovative technologies in our manufacturing and deliver high-end products to our customers."
Low resource availability	"Our company reached an annual turnover of 914,000 Yuan in 2018. We employ over 30 people in total. We apply manufacturing technologies of long traditions and deliver high-quality products to our customers."
Control	"This is the end of the page."
Note: Messages shown were translated into Mandarin Chinese.	

**Appendix A.4:** Item statistics and related constructs

	Construct (Source)	Items	Scale	Study 1				Study 2			
				Mean	SD	Factor loading	CA	Mean	SD	Factor loading	CA
	Attitude toward the ad (Severn et al., 1990)	Boring/interesting	seven-point semantic differential	4.76	1.50	0.92	0.90	4.92	1.72	0.92	0.91
		Unfavorable/favorable		4.93	1.47	0.94		4.98	1.69	0.95	
		Unbelievable/believable		4.84	1.52	0.88		5.08	1.57	0.88	
	Product evaluation (Grant et al., 2004)	Bad/good		5.24	1.29	—	—	5.36	1.40	0.95	0.93
		Dislike/like		5.13	1.43	—		5.25	1.48	0.94	
		The product appears to be of high/low quality.		—	—	—		5.49	1.23	0.91	
Manipulation check	**Perceived power** (Adapted from (Fuchs et al., 2010; Spreitzer, 1995)	I can influence to some extent how the product (rice) is produced by this company.	1 = "strongly disagree"; 7 = "strongly agree"	4.42	1.56	0.93	0.92	4.33	1.71	0.90	0.88
		I see that I have some control in determining what kind of products will be produced by this company.		4.31	1.66	0.93		4.33	1.77	0.91	
		I have some influence in determining which products will be sold by this company.		4.47	1.61	0.92		4.43	1.67	0.89	
Mediators	**CO** (Adapted from (Blocker et al., 2011; Walsh and Beatty, 2007)	This company…	—"—								
		…Treats customers courteously.		5.34	1.32	0.78	0.87	5.54	1.34	0.79	0.82
		…Is concerned about customer needs.		5.15	1.38	0.88		5.48	1.44	0.88	
		…Is willing to accommodate my requests.		5.00	1.40	0.88		—	—	—	
		…Sees customer interest as priority.		4.87	1.54	0.85		5.21	1.45	0.89	
	CER (Adapted from (Turker, 2009; Walsh and Beatty, 2007)	This company…	—"—								
		…Seems to be environmentally responsible.		5.41	1.36	0.89	0.78	5.36	1.55	0.93	0.87
		…Would try to minimize its negative impact on the natural environment.		5.55	1.23	0.91		5.47	1.59	0.93	
		…Would reduce its profits to ensure a clean environment.		4.60	1.56	0.72		4.67	1.70	0.82	

	Construct (Source)	Items	Scale	Study 1				Study 2			
				Mean	SD	Factor loading	CA	Mean	SD	Factor loading	CA
Dependent variable	**Purchase intention** (Dodds *et al.*, 1991)	The likelihood of purchasing the product is…	1 = "very low"; 7 = "very high"	4.98	1.40	—	—	5.08	1.49	0.95	0.95
		My purchase intention the product is…		4.98	1.48	—		5.06	1.53	0.96	
		The probability that I consider buying the product is: …		—	—	—		5.01	1.55	0.95	
Controls / covariates	**Purchase habits** (self-developed)	During the last year… …How often have you bought rice online?	1 = "not often at all"; 7 = "very often"	3.84	1.90	—	—	4.02	2.08	—	—
		…How often have you bought environment-friendly products?		4.95	1.46	—		5.25	1.49	—	
	Message familiarity/ comprehensibility (self-developed)	The message appeared familiar to me.	1 = "strongly disagree"; 7 = "strongly agree"	4.65	1.37	—	—	—	—		
		The message confused me when reading it.		2.95	1.55	—		—	—		
	Social desirability (Adapted from (Crowne and Marlowe, 1960)	I am always willing to admit it when I make a mistake.	1 = "disagree"; 5 = "agree"	3.99	0.78	0.50	0.55	4.17	0.71	0.64	0.55
		I am sometimes irritated by people who ask favors of me. R		3.23	1.05	0.75		—	—	—	
		I have never been irked when people expressed ideas very different from my own.		3.25	1.07	0.61		3.54	1.09	0.77	
		There have been occasions when I took advantage of someone. R		3.50	1.10	0.72		—	—	—	
		I am always courteous, even to people who are disagreeable.		—	—	—		3.95	0.91	0.76	
Manipulation checks (Study 2)	**Company size** (self-developed)	Based on the description, what do you think about the size of the company? The company appears to be: …	1 = "very small"; 7 = "very large"	—	—	—	—	4.91	1.64	—	
	Resource availability	In general, I think that this company's resources are probably very rich.	1=strongly disagree;	—	—	—	—	5.22	1.48	—	

	Construct (Source)	Items	Scale	——— Study 1 ———				——— Study 2 ———			
				Mean	SD	Factor loading	CA	Mean	SD	Factor loading	CA
	(self-developed)	I believe that this company has rich resources for its production and operations.	7=strongly agree	—	—	—		4.88	1.62	—	

Notes: CA = Cronbach's alpha. [R] Reverse coded items (recoded before analysis). Factor loadings are derived from principal component analyses.

Appendix A.5: Group means for CO and purchase intention

(a) Customer Orientation

(b) Purchase intention
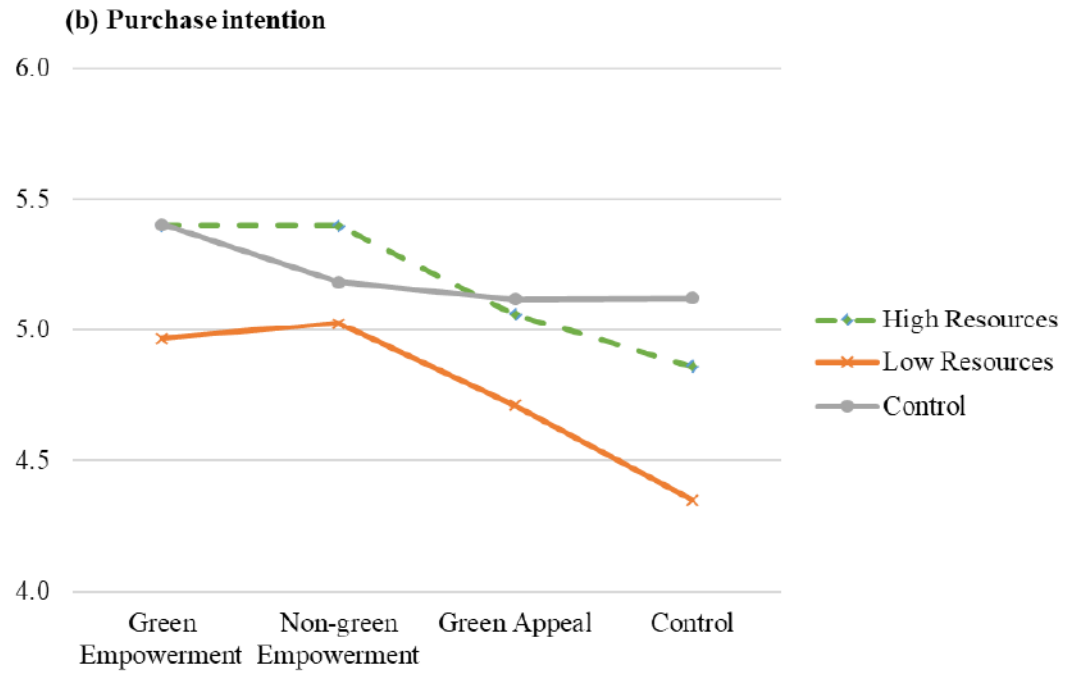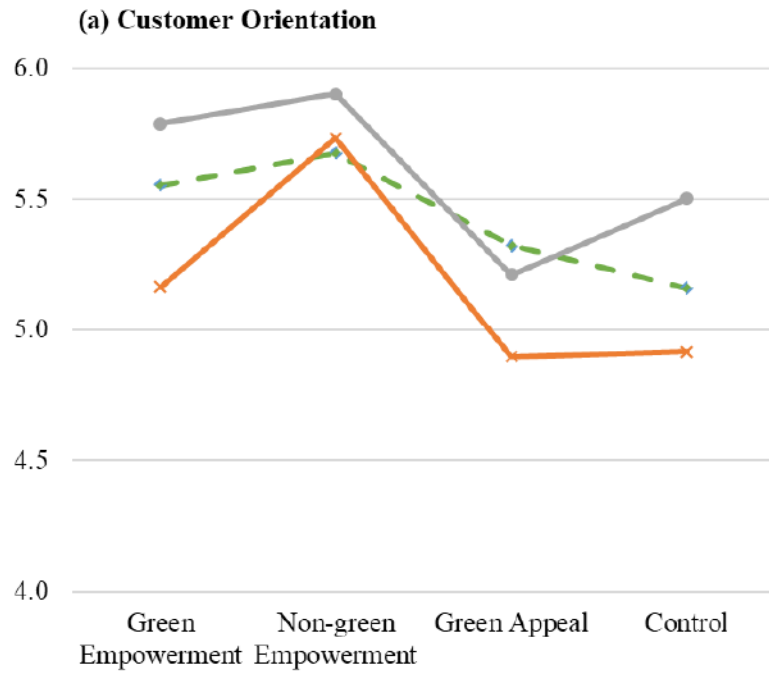
E. Article IV: Sustainability Apps – the Key to Promoting Sustainable Shopping?

Authors: Anna-Katharina Jäger, Dr. Anja Weber, Prof. Dr. Manfred Kirchgeorg

Jäger, A.-K., Weber, A. and Kirchgeorg, M. (2020), "Sustainability Apps – the Key to Promoting Sustainable Shopping?", Marketing Review St. Gallen, Vol. 4, pp. 64-71.

F. Summary and Conclusion

The present cumulative dissertation aims to narrow the intention-behavior gap and thereby contribute to a more sustainable economy. To reach this goal, several strategies were examined within four empirical research articles. The results of these articles as well as their contributions and managerial implications shall now be condensed in the last section of this thesis. Further, general limitations as well as future research perspectives will be reflected.

1. Summary of Findings and Contributions

In the four articles of this thesis, different communication strategies were examined to promote the sales of sustainable products at the POS. In Article I, it became clear that the use of new technologies, i.e. interactive augmented reality screens, can be a promising tool to draw consumers' attention to sustainability information at the POS and to stimulate green purchasing behavior. The study is one of the first to prove the effects of such POS technologies and, to our knowledge, the first to be dedicated to examining sustainable products. It thereby makes a decisive contribution to the research of POS technologies and also to sustainability marketing by combining both research streams.

Article II further explored the psychological process underlying the effectiveness of message framing in green advertising. We were able to show that arguments consumers are more familiar with are considered to be more credible. Likewise, concretely framed low-construal messages are judged as more credible than abstractly framed high-construal ones. This study thus contributes to the two green advertising research strands on benefit types and the Construal Level Theory by demonstrating their independent effects on the credibility of an advertisement and thus on purchase intentions. As far as we know, this process had not been researched before and the results emphasize the importance of the credibility for green advertising. Sustainable products are credence products, so consumers must be given trust in the sustainability promises. We show that this can be done communicatively by choosing well-known arguments and framing the message concretely.

Trust probably also plays a decisive role in the third article, although it is not explicitly integrated into our research model. Empowering consumers can strengthen their trust in a company and its sustainability efforts. It is made clear to consumers that a company must comply with the wishes of the consumers, since they have purchasing power. The promise to do so then seems correspondingly more credible and the company is assessed more positively,

which increases purchase intentions. This is especially true when consumers have the impression that a company also has the necessary resources to implement more sustainable strategies. Article III shows for the first time the huge potential of green consumer empowerment via empowerment ads and thus makes a substantial contribution to empowerment research and also to green advertisement research.

The relevance of trust for green consumption also becomes particularly clear in Article IV. Focus groups showed how big consumers' information deficit regarding sustainable products actually is, resulting in a lack of trust in corresponding promises. With the help of an app, we wanted to reduce these informational barriers – a new and not yet investigated approach. However, it became evident that the consumer's desire for information conflicts with a desire for convenience and a lack of time, which is why simple decision-aids are needed that convey trust without large amounts of information. The eco scores tested in our article seem to be a promising tool that should be examined further in practice. Nevertheless, if eco scores conflict with consumer's existing assumptions about sustainability aspects, they have to be applied carefully to not cause consumer confusion.

Overall, although different communication strategies have been examined and different implications have been derived, the following synopsis of results can be formulated: (1) Consumers have limited cognitive resources, especially if they are under time pressure at the POS. Therefore, their attention must either be drawn to more elaborate sustainability information, e.g. through new technologies, or they have to be provided with a very simple and intuitive decision-making aid (e.g. an easily comparable eco score, see Article IV). (2) However, both strategies require the trust of consumers in the information provided. This can be communicatively supported by choice of arguments and framing (Article II) or conveyed by a credible source (Article IV). Making consumers aware of their influence on the company will probably also strengthen their trust in advertising messages (Article III); however, this must be examined in more detail in the future (see section F.3).

2. Overall Managerial Implications

To derive condensed managerial recommendations from these findings, one must first consider whether a single sustainable product should be advertised or whether all purchase decisions should be moved towards more sustainable products (i.e. concrete purchase decision vs. sustainability of the entire shopping cart). The best strategy can then be chosen from the

results presented. For example, if a producer of a sustainable product wants to advertise his or her specific product, it is advisable first to attract the attention of consumers, e.g. through augmented reality applications at the POS. These should be as new and surprising as possible, interactive and engaging as well as positioned closely to the shelf in order to achieve an optimal effect. If the consumer's attention to the presented content is ensured, one of the two advertising strategies examined in this dissertation can be used (see Articles II and III; Figure 8 left side). Either arguments that are familiar to consumers (i.e. environmental benefit arguments) are applied and framed concretely, because the advertisement then appears particularly credible, or the consumer is empowered, which has a positive impact on the company's perceived environmental responsibility and customer orientation. Which strategy is chosen should be made dependent on the individual product and the awareness of sustainability arguments for this product as well as on the perceived resources of the company; large companies seem to be particularly successful with empowerment ads, as our results demonstrated.
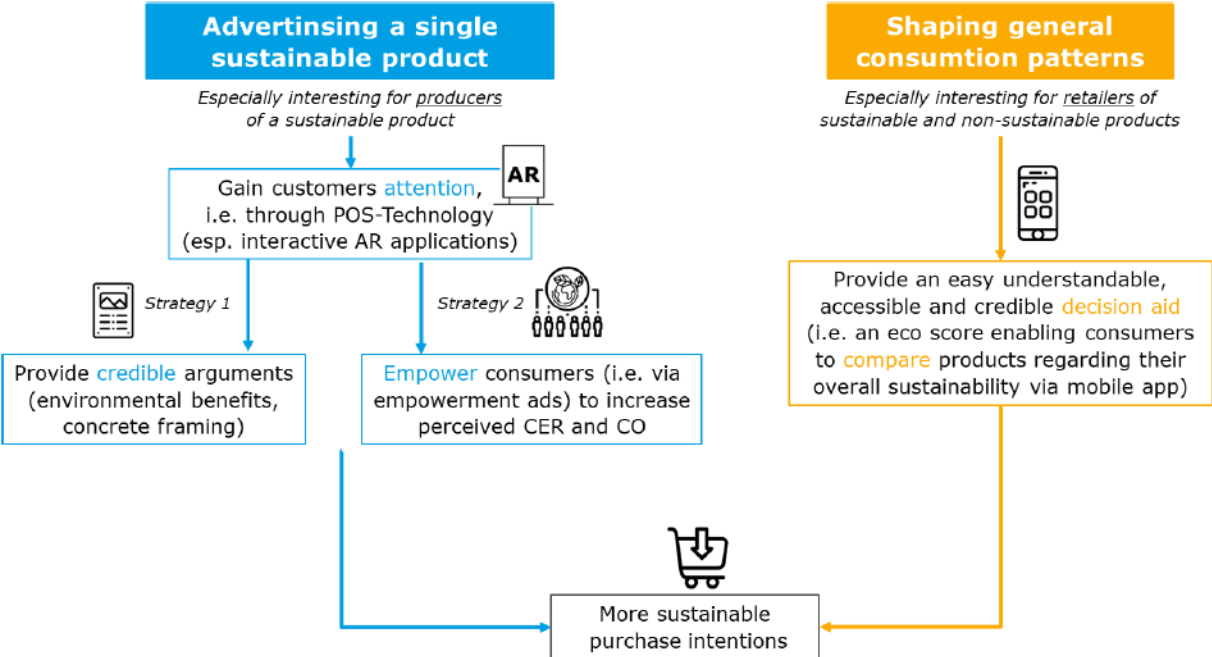

Figure 8: Condensed managerial implications derived from all four articles of this dissertation

Nevertheless, if a retailer wants to encourage his customers to choose generally more sustainable products, specific product advertisements might not be the right strategy. The retailer could instead apply an intuitive and credible decision-aid directly at the point of sale, i.e. via a mobile app. Eco scores that combine different sustainability aspects into a single indicator have offered themselves as a promising option in Article IV. However, too much

information seems to be counterproductive, since consumers are then rather confused and uncertain about their purchase decision. Furthermore, to assure the credibility of the decision aid, we recommend a cooperation with a credible and independent source such as a scientific institution to provide the eco scores, since the retailer might be suspected to "greenwash". These condensed managerial recommendations are also depicted in Figure 8.

3. Limitations of this Thesis and Future Research

On the one hand, this dissertation offers sustainability marketing researchers new insights for future research; on the other hand, it provides interesting practical implications for the marketing of sustainable products. However, there remain several unanswered questions that will be addressed in this last section.

Perhaps the most important limitation of this work is that actual buying behavior was only examined in Article I. The other three articles are limited to buying intentions, which might differ strongly from actual behavior. Although we tried to create realistic buying situations in these studies, we might report results biased by an intention-behavior gap (see e.g. Sheeran and Webb, 2016) instead of an attitude-behavior gap (see section A.2). Therefore, the results found here urgently need to be further examined in practical studies.

The second limitation concerns the samples used. Although attempts were made to increase the transferability of the results to all consumers with the help of representatively selected participants (Article II and IV), we only examined consumers of two local supermarkets in Article I, and only young and high educated Chinese samples in Article III. Future studies must therefore consider other consumer groups and also other nations to ensure the external validity and international transferability of the effects presented.

The third general limitation of this thesis is a theoretical one. As was highlighted in the previous chapter, *trust* in credence products, such as sustainable products, seems to play an enormous role in consumer buying intentions. We assumed that consumer empowerment also affects company evaluations and purchase intentions through credibility (see Article III). This assumption has to be tested empirically in future studies. Similarly, other design aspects of green advertising could actually have an impact via this mediator, such as gain vs. loss framing (see e.g. Segev *et al.*, 2015), so credibility could be an important crux of the matter for explaining the success of green advertising that needs further investigation.

However, it will not be sufficient to shed light only on the consumer perspective, as it is done within this thesis. The management context also needs to be examined more closely. On the one hand, consumer confidence in companies must not be disappointed, since skepticism, which is generated by "greenwashing", is very difficult to dissolve (see e.g. Zhang *et al.*, 2018). On the other hand, managers of companies experience a similar information- and incentive-problem regarding sustainable products as consumers do (Suchanek, 2015). Likewise, they probably do not know what constitutes the sustainability of a product and cannot predict whether consumers will reward the investment in more sustainable production with their purchasing behavior. Ways must therefore be found to strengthen mutual trust between company management and customers in order to lower transaction costs for a more sustainable economy (Suchanek, 2019).

Reflecting these main limitations will hopefully provide future researchers with starting points for further research projects and thus contribute beyond this thesis's scope to a more sustainable economy. As shown in this work, various communication measures can be applied to encourage consumers to buy more sustainable products that are less harmful to the environment and to natural resources than conventional products. In addition to these measures on the company side, politicians also have a responsibility to make the production and consumption of sustainable alternatives more attractive. Slowing down climate change and establishing a sustainable economy in the sense of ecological, social, and economic sustainability is a shared responsibility of company leaders, consumers, and politicians. I hope this thesis will make a small contribution to this goal and I would like to end with a quote from Greta Thunberg trying to shake the world up:

"Sometimes we just simply have to find a way. The moment we decide to fulfill something, we can do anything. And I'm sure the moment we start behaving as if we were in an emergency, we can avoid climate and ecological catastrophe. Humans are very adaptable: we can still fix this. But the opportunity to do so will not last for long. We must start today. We have no more excuses."

Greta Thunberg (climate activist)

In her speech to the UK Houses of Parliament, April 2019; retrieved from The Guardian (2019)

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