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FOSTERING PRO-ENVIRONMENTAL BEHAVIOR WITH GREEN CONSUMER IS: THE EFFECTS OF IS-INDUCED CONSTRUAL AND GENERAL IS USAGE MOTIVATIONS

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FOSTERING PRO-ENVIRONMENTAL BEHAVIOR WITH GREEN CONSUMER IS: THE EFFECTS OF IS-INDUCED CONSTRUAL AND GENERAL IS USAGE MOTIVATIONS

Research in Progress

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Abstract

In the context of the environmental challenges we are facing, technology is often seen as both a cause of and a potential remedy for humanity's environmental impact. Green consumer information systems (IS) have shown to be powerful in promoting individuals' pro-environmental behavior. Yet, there is little knowledge about the mechanisms of how information systems lead to a sustainable change in behavior for the good. To fill this gap, we propose an experiment on the basis of a research model that sheds light on two critical aspects of how green consumer IS affects pro-environmental behavior: First, green consumer IS may be used to induce higher-level construals that foster superordinate determinants of pro-environmental behavior by displaying rather abstract than concrete information. Second, we analyze the direct and indirect role of technology adoption as a means to motivate pro-environmental behavior. To test our hypotheses, we propose an online experiment on eco-driving feedback and present first drafts of stimuli. Implications for consumer IS theory as well as for practice regarding feedback design are discussed.

Keywords: green consumer IS, feedback IS, construal level theory, technology adoption, eco-driving.

1 Introduction

There is growing evidence that environmental processes such as global warming, rising oceans, and ocean acidification can only be slowed down and not reversed (Malhotra et al. 2013). Hence, environmental sustainability is a real, colossal, and urgent challenge that must be addressed with some haste. In the context of this environmental challenge, technology is both a cause and a potential remedy (Boudreau et al. 2008; Watson et al. 2010). Under the notion of 'green information systems (IS)', firms and researchers investigate information and communication technology as a cause of environmental concerns (Murugesan 2008). Thus, green IS refers to the study of "technology, energy efficiency and equipment utilization (Boudreau et al. 2008)" (Malhotra et al. 2013, p.1266). Technology may also be instrumental in fighting negative environmental effects (Erek et al. 2009). Green IS captures this idea and refers "to the study of the design, implementation, and impact of information systems that contribute to sustainable business processes (Boudreau et al. 2008)" (Malhotra et al. 2013, p.1266). The majority of green IS studies are at the organizational level of analysis (Malhotra et al. 2013; Jenkin et al. 2011) and only few studies focus on the application of green consumer IS, which help individuals to behave more pro-environmental (Loock et al. 2013; Malhotra et al. 2013). This is in contrast to growing evidence, that IS can play a vital role in exerting a positive influence on the beliefs and behaviors of individuals (Loock et al. 2013; Froehlich 2009; Mankoff et al. 2007; Holmes 2007; Bottrill 2007). IS that support users in changing their behavior by providing feedback on current performance and goals have shown to be very effective, particularly in domains where information about the outcome of a behavior is fuzzy and not experienced directly (Loock et al. 2013; Kluger & DeNisi 1996). Pro-environmental behavior perfectly falls in this category as it mostly has outcomes that are either fuzzy (e.g. unknown fuel consumption while driving) or that have rather long-term impacts, like global warming (for an overview on feedback for pro-environmental behavior, see Karlin et

al., 2015; for an overview on eco-driving feedback, see Dahlinger and Wortmann, 2016). Green consumer IS appear to be especially promising to foster pro-environmental behavior (PEB) by activating social norms (Loock et al. 2011; Watson et al. 2010). People often observe and act according to what behavior is commonly performed and appreciated by others (Cialdini et al. 1991). Hence, several recent studies (Peschiera and Taylor 2012; Chen et al. 2012) have examined the impact of green consumer IS, e.g. by providing comparative energy usage feedback (“your consumption vs. your neighbors’ consumption”). However, using data from 600,000 households, Allcott (2011) found that social normative feedback interventions reduced energy consumption by only a modest 1.1 to 2.8 percent. In addition, Allcott (2011) concludes that “learning the social norm can fail to motivate households with low baseline consumption or even cause them to increase consumption” (p. 20).

Therefore, we propose a more comprehensive IS-based approach towards fostering pro-environmental consumer behavior, which activates social norms as well as personal norms and additionally strengthens attitude toward PEB. We build upon latest findings from psychology and marketing (Dhar and Kim 2007; Kim et al. 2009), which identify construal level theory as a vital lens to analyze sustainable behavior. Using a green consumer IS we induce higher level construals, i.e. relatively abstract, coherent, and superordinate mental representations (Trope and Liberman 2010). More specifically, we investigate if and how IS-induced construal level is positively related to determinants of PEB. In addition, we shed light on a very fundamental consumer IS effect by not stopping on the research level of technology adoption (Davis et al. 1989) but rather using technology adoption as a direct and indirect way to motivate the behavior of actual interest, which in our case is PEB.

Summing up, in this article we theorize how green consumer IS can serve to induce construal level and how it may directly and indirectly motivate PEB. To evaluate our hypotheses, we plan to conduct an online experiment in order to analyze to what extent and how the aforementioned effects influence intentions to behave pro-environmentally. The results will allow us to draw conclusions for green consumer IS design on the basis of our researched socio-psychological model.

2 Research Model and Hypotheses Development

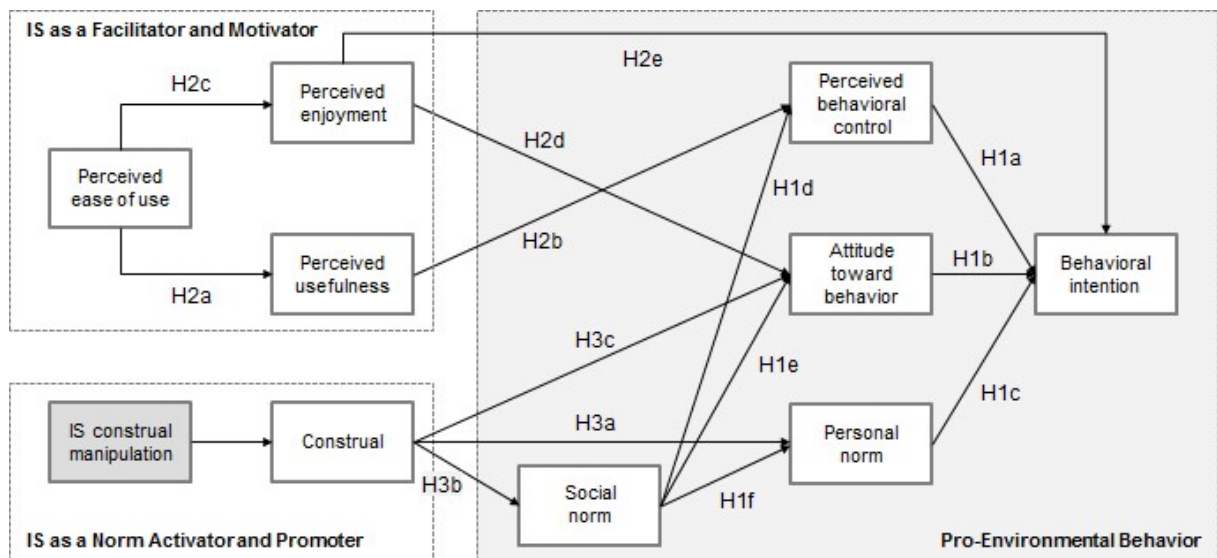


Figure 1. Proposed Research Model

In order to investigate the influence of green consumer IS on PEB, we adopt intention to behave pro-environmentally as the dependent variable. Our research model is depicted in Figure 1. We hypothesize four major effects of green consumer IS on the dependent variable and its antecedents. First of all, a green consumer IS can act as a “facilitator”. It can simply be a means to enable PEB, just like an en-

terprise IS that is used to improve job performance. Second, a green consumer IS can act as a “motivator”. It can provide hedonic value and even become superordinate to the PEB. Thus, people might even use a green consumer IS solely because it is fun to use. Acting pro-environmentally, which goes along with using the IS, just becomes a positive side effect of IS usage. Third, by inducing high level construals a green consumer IS can act as an “activator” for personal as well as social norm, two fundamental antecedents of PEB. Fourth, IS-based construal manipulations might also positively influence attitude toward PEB, i.e. IS might serve as “promoters” of PEB.

2.1 Pro-Environmental Behavior (PEB)

To explain PEB we integrate theory of planned behavior (TPB; Ajzen 1991) and norm-activation theory (NAM; Schwartz 1977), two of the most powerful theories to predict PEB, thereby reflecting that PEB is driven by self-interest as well as pro-social motives (Bamberg and Möser 2007). We build upon Bamberg and Möser’s (2007) approach to combine both theoretical frameworks, and hence take TPB as the basis and replace, as a first means, subjective norm (TPB terminology) resp. social norm (NAM terminology) with personal norm as a direct determinant of behavioral intention. Two major arguments support this replacement. First of all, there is strong evidence for personal norm as a powerful (direct) determinant to explain behavioral intention (Harland et al. 1999; Parker et al. 1995; Abrahamse and Steg 2009). Second, existing TPB applications indicate a rather indirect effect of social norms on intention for PEB (Armitage and Conner 2001; Hopper and Nielsen 1991; Nigbur et al. 2010). We will conceptualize this indirect effect later in our process of theorizing. Bamberg and Möser (2007) successfully tested their theoretical framework in a meta-analytic structural equation model (Viswesvaran and Ones 1995) that included 46 studies on PEB.

The effect of a person’s perceived behavioral control and attitude on intention has been tested in a large body of research on PEB (Hines et al. 1987; Bamberg and Möser 2007). In most studies, attitude had a slightly higher predictive power than perceived behavioral control (Lindenberg and Steg 2007). In the case of our study, TPB is applied in the context of eco-driving. Eco-driving can be seen as a PEB due to its obvious environmental impact (Peattie 2010). Hence, we expect both attitude towards PEB and perceived behavioral control to predict a person’s intention to behave pro-environmentally, i.e. to drive eco-friendly.

H1a: Perceived behavioral control of PEB is positively related to intention to behave pro-environmentally.

H1b: Attitude towards PEB is positively related to intention to behave pro-environmentally.

Personal norm has shown to significantly contribute to the explanation of many kinds of PEB (Harland et al. 1999; Bamberg and Möser 2007). The fundamental reason for this outstanding influence is the strong altruistic and hence moral nature of PEB (Thøgersen 1996; Lindenberg and Steg 2007).

H1c: Personal norm is positively related to intention to behave pro-environmentally.

Social norms play a vital role on the context of PEB. First of all, people follow social norms because they fear social pressure (Ajzen 1991). However, social norms also have an informational influence on people. Sherif’s (1936) classical study on the informational influence of social norms revealed, that often people follow social norms not because they fear social pressure, but because they use social norms as information about what behavior is appropriate. Thus, social norms do not only provide information whether a specific behavior is morally right or wrong but also whether it is beneficial or easy to perform (Bamberg and Möser 2007).

H1d: Social norm is positively related to perceived behavioral control of PEB.

H1e: Social norm is positively related to attitude towards PEB.

H1f: Social norm is positively related to personal norm.

2.2 IS as Facilitator and Motivator

The logic of acceptance and use of consumer IS is often framed in the context of motivational theory (Heijden 2004; Deci 1975; Hagger & Chatzisarantis 2009). Motivation theorists distinguish between two broad classes of motivation. Extrinsic motivation refers to “doing something because it leads to a separable outcome” (Ryan and Deci 2000, p.55). Intrinsic motivation denotes “doing something because it is inherently interesting or enjoyable” (Ryan and Deci 2000, p.55). Within the IS community, motivation research has been inspired by Davis et al.'s (1992) motivational model, which applies motivational theory to understand new technology adoption and use (Venkatesh et al. 2003; Gerow et al. 2013; Malhotra et al. 2008). Many studies in IS research have since revisited the theme of motivation in user acceptance research, typically operationalizing extrinsic motivation as perceived usefulness and intrinsic motivation as perceived enjoyment or playfulness (Gerow et al. 2013). Building upon the motivational model, green consumer IS can have utilitarian as well as hedonic impact. Looock et al. (2013), for example, present a utilitarian green IS for consumers to monitor and manage their electricity consumption. Flüchter and Wortmann (2014), as another example, investigate the importance of intrinsic motivation in the context of green IS and sustainable transportation. Note that we use large parts of adoption theory as a means to predict determinants of pro-environmental behavior rather than IS-use (for a comparison of both models, see Mathieson 1991).

To unfold their utilitarian potential and act as facilitators of PEB, green consumer IS, like any other type of IS, should be easy to use. More specifically, there is extensive empirical evidence that perceived ease of use is significantly related to perceived usefulness and a direct determinant of perceived usefulness (Davis et al. 1989; Venkatesh 1999). All else being equal, the less effortful a system is to use, the more using it can increase performance (Venkatesh and Davis 2000).

H2a: Perceived ease of use of green consumer IS is positively related to perceived usefulness of green consumer IS.

A green consumer IS, which is perceived as useful, should make PEB easier. Green IS facilitate sustainable behavior in multiple ways. They can, for example, provide fundamental information about actual energy consumption (Tasic et al. 2015). Thereby, they create transparency and serve as a fundamental means to enable goal directed behavior. As another example, they can suggest proven energy savings actions (Looock et al. 2013). In the context of our study, a smartphone app is used to provide fuel consumption information to drivers. Hence, they can understand the relationship between driving behavior and fuel consumption better and consequently act more effectively. Ultimately, the app serves as a facilitator to make eco-driving easier. On the basis of this argumentation, we expect perceived usefulness of the app to have a positive impact on perceived behavioral control of PEB.

H2b: Perceived usefulness of green consumer IS is positively related to perceived behavioral control of PEB.

To unfold their hedonic potential and act as motivators of PEB, green consumer IS have to pay special attention to ease of use. Ease of use becomes a decisive determinant of IS acceptance in hedonic contexts (Heijden 2004). In a utilitarian context, IS are means to enhance performance. Hence, ease of use is judged in the context of performance improvement and subordinate in the intention forming process (Heijden 2004). A hedonic IS delivers value in the form of enjoyment even in the case of missing performance improvements. The IS can become the end while PEB becomes subordinate. Thus, the focus is much more on the system itself, so that ease of use has a substantial impact on perceived enjoyment, which serves as the fundamental usage motivation.

H2c: Perceived ease of use of green consumer IS is positively related to perceived enjoyment of green consumer IS.

If the PEB becomes subordinate to the IS, people might adapt their attitude towards PEB on the basis of their IS perception. In early adoption stages, this function can be explained by the well-known “halo

effect”, i.e. general attitudes toward a salient object (perceived enjoyment of the green consumer IS) trigger similar attitudes toward broader, related objects (attitude towards PEB) (Beckwith and Lehmann 1975; Holbrook 1983; Kardes et al. 2004). In later stages of IS adoption, Bem's (1967) theory of self-perception provides a basis to explain the shift in attitude towards PEB. Even if people use a green IS because of hedonic reasons and they behave pro-environmentally just as a “side effect”, self-perception theory predicts that people adapt their attitudes to their new behavior. Hence, even if the IS is no longer available, the more favorable attitude towards PEB should remain.

H2d: Perceived enjoyment of green consumer IS is positively related to attitude towards PEB.

If hedonic motivation to use a green consumer IS becomes very significant and the PEB is an inevitable consequence of green consumer IS use, people might even act pro-environmental if they have a negative attitude towards PEB, feel no moral obligations and find it hard to perform the PEB. Hence, people might form an intention to behave pro-environmentally directly on the basis of perceived IS enjoyment. In the case of our study, a young driver might, for example, find “eco-driving is slow driving and thus uncool” (negative eco-driving attitude). However, he also might find the green consumer IS promoting eco-driving fun to use: “I love that fun app and beating my own eco-score on long and boring trips” (high perceived enjoyment of green consumer IS). Thus, if questioned for eco-driving he might conclude: “Yes, I intend to drive in a fuel-efficient way” (high intention to eco-drive).

H2e: Perceived enjoyment of green IS is positively related to intention to behave pro-environmentally

2.3 IS as a Norm Activator and Promoter

Research on morality provides evidence that people often base their judgments on moral rules and neglect moderating contextual information (Haidt 2001; Sunstein 2005). In accordance with these findings, research on personal values has shown that individuals would protect certain values, such as honor, love, justice, and life (e.g. Tetlock et al. 2000) no matter how small the sacrifice or how large the benefit is (Eyal et al. 2008). However, there is also conflicting evidence that people compromise their protected values when the probability or amount of harm is small relative to the probability or magnitude of benefit (Baron and Leshner 2000). CLT contributes to this dispute and suggests that people are more likely to rely on norms in the case of high-level construal, where contextual details are omitted, e.g. induced by psychologically distant events (Eyal et al. 2008). Acknowledging that norms can be personal as well as social, we conclude that in the context of our study, IS-induced construal can “activate” personal as well as social norm. Thus,

H3a: Construal is positively related to personal norm.

H3b: Construal is positively related to social norm.

CLT research reveals that high-level construal can have a positive effect on attitude. Eyal et al. (2004) demonstrate that in considering an action, considerations against the action (cons) tend to be subordinate to considerations in favor of the action (pros). Cons are only evaluated if the level of pros is sufficient, whereas pros are evaluated independent of the level of cons. Eyal et al. (2004) ultimately provide evidence that with high-level construal, i.e. mental representations of actions are reduced to their essence and omit all details, pros become more salient, whereas the reverse is true for cons. Hence, IS might serve as a means to evoke high level construals thereby acting as promoter positively influencing attitude towards PEB.

H3c: Construal is positively related to attitude towards PEB.

3 Proposed Methodology

The goal of our research is to theorize how green consumer IS can act as facilitators, motivators, activators and promoters to foster PEB. Thereby, we are particularly interested in the positive effects of high construal levels. While our hypothesis can be validated without the experimental manipulation of construal level, from a relevance perspective two fundamental questions arise, which strongly motivate an experimental manipulation of construal level: (1) “How can high level construal be induced on the basis of green consumer IS?” and (2) “Can construal level at all significantly be influenced by these manipulations?” While a thorough analysis of these two questions goes beyond the scope of our research, we propose to include an experimental manipulation of construal level in order to get first insights into these highly relevant questions. We want to conduct our research as part of a requirements analysis for an eco-driving smartphone application. Eco-driving can be classified as a PEB due to its environmental relevance (Peattie 2010). The application used in the study will be designed to record and track driving behavior and to provide customized feedback on the own driving style to foster and support eco-driving.

3.1 Development of Stimuli

To develop our experimental stimuli we build upon two of the most common approaches to manipulate construal level. Numerous studies have shown that distant events are represented in a more abstract, structured, high-level manner than near events (Trope and Liberman 2010; Trope et al. 2007). Hence, we decided that the low construal stimulus is presenting real time information, i.e. the stimulus is depicting what is happening now and the high construal stimulus is showing aggregated monthly information, thus also reflecting more distant events. The stimuli are depicted in Figure 2.

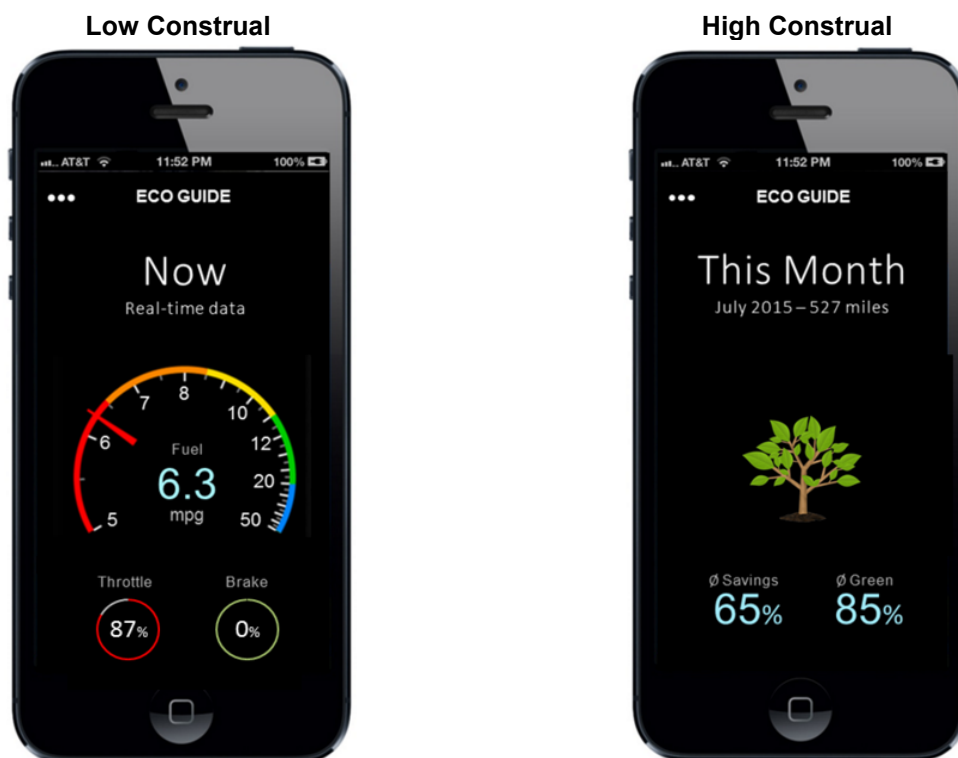


Figure 2. Experimental Stimuli

Past work has also confirmed that a “why” vs. “how” prime successfully manipulates the level at which participants construe objects (Ledgerwood and Callahan 2012; Fujita et al. 2006; Agrawal and Maheswaran 2005). In the abstract-mindset condition people are requested to generate superordinate, abstract answers to the question of why they engage in a specific activity. In the concrete-mind-set condition, participants are instead asked to generate subordinate, concrete answers to the question of how they engage in the same activity. Building upon these findings, our low construal stimulus is presenting very concrete driving information on the basis of detailed gauges geared towards “how to eco-drive”. In contrast, the high construal stimulus is depicting goal-related information on the basis of more abstract representations, i.e. a tree and simple numbers, geared towards “why you drive eco-friendly”. The stimuli in the context of the online study will include related explanations for each app screen

3.2 Study procedure and measurement instruments

We plan to first test our research model in an online experimental setting. The participants will be assigned randomly into one of two groups. One group will see the high-level construal app, the other group will see the low level construal app (Figure 2), both with according explanations about how the app works. Participants will then be given a questionnaire with the measures that reflect our research model (Figure 1). To check for an effective manipulation of participant’s construal level, we will first measure construal level with a set of six items adapted from Vasquez and Buehler (2007). Perceived ease of use (Venkatesh and Davis 2000), perceived enjoyment (Heijden 2004) and perceived usefulness (Voss et al. 2003) will adapted from well-known technology adoption research. To measure the constructs for PEB, we will derive items from research on TPB (Ajzen 1991; Sheeran 2002; Onwezen et al. 2013). Personal norms will be measured on the basis of NAM research (Onwezen et al. 2013; Gärling et al. 2003). To be able to describe the sample, we further ask the participants to provide basic socio-economic demographics like age, gender and education.

4 Conclusion and Contribution

The objective of this research in progress is to investigate how green consumer IS can act as facilitators, motivators, activators and promoters of PEB. Our proposed research model will have theoretical implications as well as practical implications regarding the design of green consumer IS that further may be applied to feedback IS in other domains.

We derive three major theoretical implications from our research that may uniquely add to the literature. (1) To better understand the process whereby people arrive at their intentions to act pro-environmentally we provide a measurement instrument for the comprehensive model of Bamberg and Möser (2007). Our model and measurement instrument are not limited to PEB and hence may be used in the context of any behavior that is driven by self-interest as well as pro-social motives, e.g. in the context of health related behavior and IS-based health interventions. (2) We shed light on fundamental relationships between green consumer IS adoption and PEB. In contrast to most existing research, we model IS as a means to an end where it is ultimately not about increasing IS use but rather PEB as the dependent variable. Specifically, we look at usefulness and enjoyment as two fundamentally different motivations to use a system. If we want to understand how these different motivations drive subsequent behavior, we have to theorize and evaluate separate relationships between these constructs and (the antecedents of) intention to behave pro-environmentally. (3) Extensive research has been conducted in the past years focusing on how social normative feedback, goal setting and defaults can be leveraged to build effective green consumer IS. A convergence of research activities towards these core themes seems to take place. We aim to broaden the research focus again and evaluate alternative pathways to stimulate pro-environmental behavior based on green consumer IS. Hence, we built upon CLT research, which provides evidence that construal manipulations are very powerful means to change behavior.

From a practitioner's perspective our results may help firms and policy makers to better understand the impact and potential of green consumer IS. More specifically, we want to address different complementing IS-driven avenues towards pro-environmental behavior, which might help to guide their activities. It is well known that green consumer IS might provide useful information to facilitate pro-environmental behavior. There is a fast growing number of fuel economy gauges in cars as part of trip computers, which intend to support drivers e.g. by depicting average and current fuel economy, just to name one example. However, firms and policy makers should also pay close attention to the hedonic value of green consumer IS in order to motivate pro-environmental behavior. We expect that perceived enjoyment might act as a particular strong driver fostering pro-environmental behavior. In the context of eco-driving, for example, a new generation of all-digital cockpits provides unprecedented possibilities to make eco-driving feedback much more enjoyable. Selected manufacturers, such as Tesla, already leverage these capabilities to deliver completely new consumer experiences. In addition, we demonstrate how IS-based construal manipulations can activate norms and promote pro-environmental behavior. Firms and policy makers should be aware of the potential of high level construal. In the light of our research, green consumer IS depicting very detailed information geared towards "how" should be challenged. More abstract representations like e.g. growing trees or leaves might be helpful means to foster a "why" mindset unleashing the positive effects of high construal. However, more research is needed to better understand the effect of construal manipulations in field settings.

5 Limitations and Future Research

For this very first setup of a CLT-based green consumer IS we decided to go for an IS design that uses two elements of construal level induction in one stimulus, i.e. temporal distance and visual abstraction. Though we think this is a legitimate and promising way for increasing variance at this early stage of research, future research will have to disentangle both effects. Another interesting question could be, whether the effectiveness of high- vs low level construal feedback depends on inter-individual differences, such as former experience with eco-driving or different personality traits. Finally, our predicted effects on PEB will have to prove themselves to be robust over longer periods of time. Therefore, and to generally increase external validity, our research approaches should be applied in a field setting using real driving situations.

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