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How detailed product information strengthens eco-friendly consumption

Abstract

Purpose: Whilst many studies consider labelling as means of aggregated communication of environmental product features, the presentation of detailed product information seems a promising alternative. However, the mechanisms through which detailed product information takes effect on consumers requires better understanding. This study empirically develops a framework that focuses on consumers' perceived usefulness of, and trust in, detailed product information, whilst also considering the role of environmental self-identity. This understanding will help businesses to further stimulate eco-friendly consumption.

Methodology: Structural equation modelling and conditional process analysis are utilised to test hypotheses based on a sample of 279 respondents to a German online survey.

Findings: Results show that the perceived usefulness of product information has a positive effect on purchase intention, and this effect is intensified by an individual's environmental self-identity. Furthermore, for consumers with high environmental self-identity, the effect of perceived usefulness of product information on purchase intention is mediated in turn by trust in detailed product information and resistance to negative information.

Originality/Value: This study contributes to the debate on the role of product information in ethical consumption by showing how detailed product information gives rise to favourable behavioural outcomes. When detailed information is perceived as being useful, it can affect purchase intention through greater trust and an increased resistance to negative information. Further, detailed product information appears beneficial for both, the mass market and specific segments with high environmental self-identity. Hence, this study empirically establishes the effects of detailed product information on consumer decision-making, thus informing sustainability-related marketing theory and practice.

Keywords

Product information, perceived usefulness, consumer trust, environmental self-identity, eco-friendly consumption

Introduction

Current consumption patterns result in severe environmental impacts such as resource exploitation, environmental pollution, biodiversity loss, and climate change (Brown *et al.*, 2011; Dagher and Itani, 2014). For example, the Millennium Ecosystem Assessment reports that "over the past 50 years humans have changed ecosystems more rapidly and extensively than in any comparable time period in human history, largely to meet rapidly growing demand for food, fresh water, timber, fibre and fuel" (UNEP, 2010, p. 23). A prompt and sustainable change towards environmentally and socially sound consumer behaviour is therefore imperative (Tonkin *et al.*, 2018). Nonetheless, it appears to be difficult for consumers to identify eco-friendly products (e.g., Borin *et al.*, 2011; Osburg *et al.*, 2017). Consumers are often not fully informed about a product's environmental criteria, which need to be understood as a complex phenomenon resulting from a range of sub-criteria (such as environmental impact, origin, material and supply chain characteristics) (Osburg *et al.*, 2016). Hence, an information asymmetry about a product's environmental features arises between producers/sellers and consumers, which must be minimized to realize a change towards eco-friendlier consumption (Sammer and Wüstenhagen, 2006). Signaling Theory (Rynes, 1991; Spence, 1973) offers further insight by describing how the information asymmetry can be reduced if senders (here: producers and sellers) disclose relevant information, which ultimately affects individual behaviour (here: eco-friendly purchase decisions). Thus, revealing environmental product information appears to be crucial when targeting eco-friendlier consumption.

Two different approaches are used to disclose a product's environmental features to consumers: a) eco-labels are a tool to inform consumers about a product's environmental compatibility in an aggregate way (Bjørner *et al.*, 2004; Magistris *et al.*, 2015)[1], and b) detailed environmental product information include the provision of, if possible, all environmentally-related product information items relevant to the purchase decision[2] (Gleim *et al.*, 2013; Osburg *et al.*, 2016). While eco-labels are well-researched and established in practice (Borin *et al.*, 2011), the utilisation of detailed product information is not thoroughly understood yet. However, detailed product information seems to be promising as it addresses some of the challenges associated with environmental labelling, for example, consumer confusion due to the variety of labels, and consumer mistrust because of unclear meanings, non-transparent certification procedures and diverse scandals (Borin *et al.*, 2011; Tonkin *et al.*, 2018). The usefulness of detailed product information has been documented in previous studies: For example, Osburg *et al.* (2016) found that ten information items, which are related to environmental features of wood-based products, increase consumers' purchase intention,. Similarly, Hasanzade *et al.* (2018) identify three segments of ethical grocery shoppers, which differ regarding their purchase decision-relevant product information items.

Although previous research has focused on the identification of consumers' preferred detailed product information items, and segment-specific information demands (e.g., Hasanzade *et al.*, 2018; Ortega *et al.*, 2011; Ubilava and Foster, 2011), it is not sufficiently understood how detailed product information actually influences consumer behaviour. The role of consumers' perceived usefulness of product information needs to be considered as an important driver of consumer behaviour (e.g., Cohen and Vandenbergh, 2012; Grewal *et al.*, 1998). Furthermore, detailed product information may enhance consumer trust, since this information is perceived

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[1] It must be considered that three types of environmental labels need to be distinguished (Rex and Baumann, 2007; based on ISO 14020). While the most common label types, Type I and Type II labels, present very aggregate information (e.g., Nordic Swan, Blue Angel), Type III labels supply comprehensive information and therefore partially follow the idea of detailed product information.

[2] Detailed product information does not necessarily have to be printed on the product (packaging), a technology-based information retrieval at the point of sale is also possible, for example, enabled through barcodes on product packaging (Appelhanz *et al.*, 2016; Hasanzade *et al.*, 2018).

as a proof or justification for the product feature under consideration (Gleim *et al.*, 2013). As previous research points to the importance of trust for purchase decisions (e.g., Bradu *et al.*, 2014; Lee *et al.*, 2011), trust must be taken into account as another potential factor influencing the effects of detailed product information.

Moreover, it must be acknowledged that eco-friendly consumer behaviour shows different facets, which need to be considered due to their interrelationships: In addition to the actual purchase decision (Osburg, 2016; Osburg *et al.*, 2017), purchase intention (Cho, 2015; Jamal and Sharifuddin, 2015) and resistance to negative information about eco-friendly products (Eisingerich *et al.*, 2011; Wilson *et al.*, 2017) require further attention. In recent years, several scandals surrounding eco-friendly consumption have been reported (Seele and Gatti, 2017), and a range of stigmas still exists surrounding the 'eco-friendly consumer' (Johnstone and Tan, 2015). For example, consumers are confronted with a growing number of greenwashing instances (i.e., when businesses present themselves or their product as eco-friendlier than they actually are), which decrease consumers' trust in, and intention to follow, environmental information (Rahman *et al.*, 2015). Furthermore, as social media is frequently used to spread negative information related to eco-friendly consumption (Eisingerich *et al.*, 2011), consumers must be resistant to this information, not least as negative information tends to affect consumption decisions more than positive information (Wangenheim, 2005). Therefore, this study addresses an important knowledge gap through examining *how* detailed product information increases environmentally friendly consumer behaviour, not only represented by purchase intention, but also resistance to negative information. This understanding will help to better assess potential benefits of detailed product information presentation, also by discussing long-term implications.

Detailed environmental product information is especially beneficial for consumers who identify themselves as environmentally friendly individuals because these consumers ascribe high importance to eco-friendly purchase decisions (e.g., Dagher and Itani, 2014; Werff *et al.*, 2013). Osburg *et al.* (2016) suggest that consumers, who identify themselves as eco-friendly individuals, tend to be particularly interested in detailed product information because they are willing to deal with a product's environmental features in greater depth. Consequently, recent studies focus on environmental self-identity to identify consumers, who particularly value eco-friendly consumption since environmentally compatible behaviour represents a relevant part of their selves (e.g., Dagher and Itani, 2014; Werff *et al.*, 2013). Although previous research indicates that detailed product information may be especially interesting for these consumers, it still needs to be explored why consumers with a strong environmental self-identity particularly benefit from the provision of detailed product information. This will also be explored in the present study and the knowledge gain will contribute to better shaping the utilisation and promotion of detailed product information, both, for the mass market and segments with high environmental self-identity.

The rest of this article is organised as follows: the *Theoretical Background* section explores the role of perceived usefulness of, and trust in, detailed product information in increasing environmental consumption, also dependent on an individual's environmental self-identity. The literature overview concludes with the introduction of a conceptual framework, which is subsequently tested in an online survey described in the *Methods* section. This is followed by a presentation of the results. The article closes with *Discussion and Conclusions* in relation to managerial and theoretical implications.

Theoretical Background

During the purchase decision process, consumers are confronted with a variety of different products. Providing consumers with relevant and meaningful information about a product's environmental features can shape consumers' preferences (Osburg *et al.*, 2016, 2017), especially if these environmental features help to differentiate the product from its competitors due to homogeneity of many other product characteristics. After focusing on the information asymmetry between producers/sellers and consumers with respect to a product's environmental characteristics, this section considers if and how detailed product information can influence consumer behaviour, and which consumer segments may particularly benefit from detailed information disclosure.

Information Asymmetry between Producers and Consumers

Consumers' purchase decisions depend on information, which has been made available to them. The role of this information in a purchase-decision making context is described by Signaling Theory (Rynes, 1991; Spence, 1973). Signaling Theory highlights that an information asymmetry exists between two parties. To reduce this asymmetry, the sender selects market signals, which communicate relevant information to the receiver (Connely *et al.*, 2011). This becomes particularly important for the communication of credence attributes, i.e., attributes, which consumers cannot verify even after purchase, such as a product's environmental features (Boulding and Krimani, 1993). For example, producers and sellers have access to many criteria determining a product's eco-friendliness and select some of these criteria (or an aggregate measure) as a market signal to inform consumers. When the receiver pays attention to these market signals, he/she interprets them, leading to a behavioural response (Connely *et al.*, 2011). Such a response does not only include actual purchase decisions; the provision of detailed, credible and transparent signals may also affect consumer trust (Atkinson and Rosenthal, 2014) and resistance to negative information (Eisingerich *et al.*, 2011). Thus, the provision of signals may also help producers and sellers to convince their potential customers of the product's superior features.

Consequently, environmental information provided by producers/sellers does not only reduce information asymmetry, it can also shape consumer responses. Signaling theory therefore alerts to information asymmetry in the context of environmental consumption and the need to reduce such asymmetry (Atkinson and Rosenthal, 2014), for example, through the provision of detailed product information. Signaling also helps truthful businesses to differentiate themselves from competitors, which show opportunistic behaviour. The provision of detailed environmental signals may allow for a more transparent and convincing presentation of environmental product features compared with general claims.

To summarize, if the information asymmetry is reduced and consumers perceive the provided information as useful, the literature on signaling theory indicates a positive influence on consumer behaviour (resistance to negative information and purchase intention) via trust. In the following, the indicated relationships are considered in greater depth.

Perceived Usefulness of Product Information and Eco-friendly Consumption

Since a consumer cannot directly verify environmental features, extrinsic cues gain in importance such as detailed product information (Kirchhoff, 2000). If consumers perceive the presented information as useful, they consider it in their purchase decision process (Cohen and Vandenbergh, 2012). Previous research revealed that consumers tend to perceive a detailed product information provision as useful, not least due to transparency and credibility associated with this type of information disclosure (e.g., Hasanzade *et al.*, 2018; Ortega *et al.*, 2011;

Osburg *et al.*, 2016, 2017). Consequently, a range of studies about the perceived usefulness of product information, and technologically-provided information, shows that perceived usefulness influences purchase intention[3] (e.g., Cho, 2015; Jamal and Sharifuddin, 2015). First, it is therefore predicted that perceived usefulness positively affects purchase intention.

Second, the provision of detailed product information, and consequently its perceived usefulness, may also be related to consumers' reaction towards negative information. If an organisation achieves a better connection with its consumers through disclosing information about its environmental and social performance, consumers may become more resistant to negative information (Eisingerich *et al.*, 2011). The provision of detailed information may increase consumers' resistance; not least as detailed information empowers consumers to make a more informed purchase decision through the reduced information asymmetry between producers/sellers and consumers. Similarly, Appelhanz *et al.* (2016) discuss that a high perceived usefulness of detailed product information can increase consumer confidence during the purchase decision process, so that an individual should become more resistant to negative information. Hence, consumers' perceived usefulness of detailed product information is supposed to foster their resistance to negative information.

Third, following the literature on signaling theory, the provision of credible and transparent signals, as represented by detailed product information, may also influence consumer trust (Atkinson and Rosenthal, 2014). Detailed product information can allow consumers to access a justification for environmental product features, which reduces uncertainty and increases trust (Gleim *et al.*, 2013; Harris and Goode, 2004). This is particularly relevant for businesses whose competitors show a high degree of opportunistic behaviour. Moreover, instances of consumers' mistrust particularly relate to general claims as frequently provided on labels; hence, consumers perceive detailed information as more convincing and trustworthy (Atkinson and Rosenthal, 2012), especially if a product can be traced back through the production and processing stages (Bradu *et al.*, 2014). Thus, the information asymmetry can be reduced when product information usefulness is high, so that consumers trust the offering more (Kim *et al.*, 2008). Based on the relationship between usefulness and trust described in the context of eco-friendly consumption, it is predicted that the perceived usefulness of detailed product information may also influence consumers' trust in detailed product information.

Hypothesis 1 (H1). Perceived usefulness of product information has a direct positive effect on purchase intention (H1a), resistance to negative information (H1b), and trust in product information (H1c).

When considering the role of trust in product information further, it must be acknowledged that trust is itself related to different forms of consumer behaviour (Lee *et al.*, 2011). Trust becomes particularly important in the purchase decision process when individuals are faced with counterarguments as they occasionally appear in eco-friendly consumption such as reports of greenwashing incidents. This is described by inoculation theory (McGuire, 1961a, b), which states that stable attitudes and beliefs tend to be immune towards counterarguments, and that contradictory information may even strengthen an individual's original attitudes. Specifically, when an individual faces a single or even sustained counterarguments, the individual generates more favourable arguments strengthening his/her own attitudes and beliefs. Such effects are well-documented in the literature (*see:* Banas and Rains, 2010). As trust represents one manifestation of attitudes (Jones, 1996), trust may help to generate resilience towards negative

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[3] Please note that an identification of the drivers of perceived usefulness is beyond the scope of this paper as they depend on individual and situational characteristics. Interested readers are referred to Osburg *et al.* (2016), who identify relevant information items for wood products, and Hasanzade *et al.* (2018), who determine purchase decision-relevant information items for grocieres. Furthermore, Osburg *et al.* (2017) demonstrate that detailed product information items should generally fulfill the characteristics of comprehensibility, meaningfulness and credibility in order to be perceived as useful and relevant for consumer decisions.

information because trust in product information can make consumers resistant towards general negative claims about eco-friendly consumption. Thus, trust in product information should influence resistance to negative information.

Additionally, product and service trust, which can be achieved through detailed information provision, has been shown to increase consumers' purchase intention (e.g., Gefen and Straub, 2004; Sichtman, 2007) and willingness-to-pay (e.g., Ortega *et al.*, 2011; Ubilava and Foster, 2009). A detailed information provision enables consumers to better understand the reasons why a product is positioned as being eco-friendly. It is thereby essential to provide information consumers perceive as relevant, credible and meaningful (Osburg *et al.*, 2017). Detailed product information increases consumer trust in the truth of an environmental claim through transparency and partially verification opportunities, which enhances the credibility of the information disclosure (Atkinson and Rosenthal, 2014). Consequently, trust is expected to affect purchase intention in addition to resistance to negative information.

Hypothesis 2 (H2). Trust in product information has a direct positive effect on resistance to negative information (H2a), and purchase intention (H2b).

Finally, both behavioural outcomes, i.e., resistance to negative information and purchase intention, are interrelated. Consumer's resistance to negative information has been described as an antecedent of actual purchase decisions (Eisingerich *et al.*, 2011; Wilson *et al.*, 2017). Research indicates that negative word-of-mouth decreases consumers' purchase intention and that such effect is even stronger than the influence of positive word-of-mouth (Cheung and Thadani, 2012). Given that consumers are consistently confronted with negative information about eco-friendly consumption and related stigmas as discussed above (e.g., Johnstone and Tan, 2015; Seele and Gatti, 2017), it is important that such information does not significantly influence purchase decisions. Hence, if consumers are resistant to general negative information about eco-friendly consumption, they should be more likely to make an eco-friendly purchase decision.

Hypothesis 3 (H3). Resistance to negative information has a direct positive effect on purchase intention.

The previous hypotheses describe an effect of perceived usefulness of product information on trust (H1c), which in turn affects resistance to negative information (H2a), and ultimately purchase intention (H3). This points to the existence of a serial mediation, which is also in line with the literature on signaling theory. The reduction of information asymmetry between producers and consumers (e.g., through the provision of detailed product information), and its associated perceived usefulness may positively affect consumer behaviour (Connely *et al.*, 2011) through an increase in trust emerging from the provision of detailed, credible and transparent signals (Atkinson and Rosenthal, 2014). Again, the two considered manifestations of consumer behaviour, i.e., resistance to negative information and purchase intention, appear to be interrelated in that resistance positively shapes consumers' purchase intention (Eisingerich *et al.*, 2011; Wilson *et al.*, 2017). Consequently, the influence of perceived usefulness of product information on purchase intention may be mediated by both, trust and negative information resistance.

Hypothesis 4 (H4). Perceived usefulness of product information has an *indirect* positive influence on purchase intention, which is mediated by 1) trust in product information, followed by 2) resistance to negative information (serial mediation).

Environmental Self-Identity and Eco-friendly Consumption

Previous research has shown that not all consumers benefit from detailed product information to the same extent (Hasanzade *et al.*, 2018; Osburg *et al.*, 2016). While the majority of consumers seems to be interested in detailed environmental information, a certain proportion does not further consider this information. The literature suggests that the value consumers ascribe to environmental product information depends on differences in individual characteristics (Akehurst *et al.*, 2012; Lee *et al.*, 2015). Specifically, a preference for detailed information about a product's environmental features may depend on the extent to which a consumer sees him/herself as an eco-friendly individual. Previous research indicates that environmentally responsible consumption is based on an individual's self-identity (e.g., Dagher and Itani, 2014; Werff *et al.*, 2013; Whitmarsh and O'Neill, 2010). Werff *et al.* (2013) define environmental self-identity as "the extent to which you see yourself as a type of person who acts environmentally-friendly" (p. 56). Self-identity is important because it leads to stability in an individual's behaviour so that environmental self-identity induces consistency across a range of pro-environmental behaviours (Whitmarsh and O'Neill, 2010). Conversely, eco-friendly consumer behaviour can also be considered as an opportunity to express an individual's self-identity and to differentiate him/herself from other consumers (Cherrier, 2007).

Following the assumptions of signaling theory, market signals reduce consumer uncertainty especially if the provided information is relevant for the individual and therefore relates to an information gap the individual actually perceives (Connely *et al.*, 2011). Similarly, Osburg *et al.* (2016) discuss that environmental market signals, such as detailed information about a product's environmental features, particularly influence purchase decisions when a consumer identifies him/herself with the provided signals. As individuals with a strong environmental self-identity are interested in environmental information because such information enables them to make an eco-friendlier choice (Barbarossa *et al.*, 2015), the perceived usefulness of detailed product information is expected to have a stronger influence on consumer behaviour if the consumer shows a strong environmental self-identity.

Hypothesis 5 (H5). The direct effect of perceived usefulness of product information on purchase intention is conditional on levels of environmental self-identity. The effect is high(low) when environmental self-identity is high(low).

The influence of detailed product information on the full process as described in H4 should also be stronger for consumers with high environmental self-identity. Environmental and social cues have been shown to particularly affect purchase decision processes of consumers who see themselves as ethical individuals (e.g., Osburg *et al.*, 2017; Yoganathan *et al.*, 2019). Consequently, if consumers have a high environmental self-identity they are supposed to perceive a stronger information asymmetry and uncertainty reduction through the provision of detailed product information, which is relevant to them, so that the perceived usefulness should affect purchase intention through an increased trust in product information and resistance to negative information.

Hypothesis 6 (H6). The indirect effect of perceived usefulness of product information on purchase intention via trust and resistance (serial mediation) is conditional on levels of environmental self-identity. The mediation effect is high(low) when environmental self-identity is high(low).

Figure 1 summarizes all hypotheses in a conceptual framework, which shows how detailed product information can increase consumers' resistance to negative information and their intention to buy eco-friendly products by being perceived as useful and trustworthy. The role of individual differences is taken into consideration through the inclusion of consumers' environmental self-identity.

Insert Figure 1 about here

Methods

Procedures and Participants

To test the conceptual framework, a German-language online survey was conducted with Qualtrics. As previous research showed that individuals aged between 18 and 30 are particularly suitable for research about the influence of detailed product information due to their generally high levels of environmental concern and technology affinity (e.g., Kanchanapibul *et al.*, 2014; Osburg *et al.*, 2016), this study is based on a student sample. Specifically, the convenience sample consisted of students from a German University, who were informed about the survey in lectures, seminars, and on social media. Out of 335 completed questionnaires, 56 respondents had to be eliminated because of inconsistent response patterns and short response time. Hence, data analysis builds on 279 respondents. The mean age was 25.43 years (SD = 9.01, range from 18 to 35); 37.3% of the respondents were male and 62.7% female. Additionally, the majority were university students (69.9%).

In the beginning of the survey, participants were welcomed and introduced to the study. Participants were asked to imagine that they want to buy a wooden[4] dining table, and that they received detailed information about the product's environmental features. Respondents received an example for detailed product information, as shown in Figure 2[5]. The example was given to all respondents to ensure that participants understand the idea of detailed product information. This approach is in line with previous studies about new forms of information disclosure, in which participants receive a general introduction/explanation in the beginning (e.g., Osburg *et al.*, 2016). Following the introduction to detailed product information, respondents were asked to answer the following questions based on the situation described, i.e., accessing information about the product's environmental characteristics through detailed product information.

Insert Figure 2 about here

Participation in the survey was voluntary, and participants could leave the survey at any time. All items were originally in English language, so that a back-translation procedure was implemented. The items were first translated into German, and subsequently back-translated by another person who is fluent in English language. Differences between both versions were only marginal and discussed until a consensus was reached. The items were presented in random order and reversed scoring was used to minimize social desirability bias. The questionnaire was pretested with ten respondents, who gave feedback on clarity and comprehensibility. Minor modifications were made before launching the study.

Measures

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[4] Wood was chosen as this resource is under threat given that wood is harvested above a sustainable level (UNEP, 2010).

[5] The presented information items were chosen in line with consumers' valued wood product information items, as identified by Osburg *et al.* (2016): country of origin, sustainable forest/plantation management, carbon footprint, portion of recycling, type of wood, material composition, additives, and health effects of additives.

The survey assessed the constructs of the conceptual model. These constructs were measured with (a combination of) established scales: 1) Environmental self-identity (Whitmarsh and O'Neill, 2010), 2) Perceived usefulness of product information (Ducoffe, 1995; Jamal and Shariffudin, 2015), 3) Trust in product information (Belonax *et al.*, 2007; Soh *et al.*, 2009), 4) Resistance to negative information (Eisingerich *et al.*, 2011), and 5) Purchase intention (Osburg, 2016). The scales had to be slightly modified to match the current research context. For example, trust in advertising (i.e., "Information conveyed in national advertising is honest/truthful/etc.") needed to be replaced by trust in detailed product information (i.e., "Information conveyed through detailed product information is honest/truthful/etc."), and the purchase intention items had to be specified for the scenario of buying a wooden dining table.

Respondents indicated their agreement on five (Environmental self-identity, Perceived usefulness, Trust in product information), and seven-point scales (Resistance to negative information, Purchase Intention), ranging from 1 (strongly disagree) to 5(7) (strongly agree). The scales were chosen based on the utilisation in their original measurements.

Data were prepared for subsequent analysis and the proposed framework was tested using IBM SPSS v.24 and AMOS v.24 with Hayes (2013) PROCESS macro for conditional process analysis.

Results

A confirmatory factor analysis (CFA) established the relevant validity and reliability measures for each construct as provided in Table 1, as well as satisfactory global fit indices for the measurement model (Table 2) in comparison to *vis-à-vis* established benchmark values (Arbuckle, 2013; Hu and Bentler, 1999). Further details on scales and item-properties are provided in the appendix.

Insert Table 1 and 2 about here

Results show that perceived usefulness of product information has a significant direct effect on purchase intention (β=.2881; *p*<.001; CI: .1692, .4070; SE=.0604) and trust in product information (β=.3109; *p*<.001; CI: .1985, .4223; SE=.0571), but not on resistance to negative information (β=.0928; *p*>.05). Hence H1a and H1c are supported, but H1b is not supported. In turn, trust in product information has a significant direct effect on resistance to negative information (β=.2503; *p*<.001; CI: .1311, .3695; SE=.0606), but not on purchase intention (β=.0719; *p*>.05); hence, H2a is supported, but H2b is not supported. Finally, H3 is supported as resistance to negative information has a significant direct effect on purchase intention (β: .1220; p<.05; CI: .0064, .2377; SE=.0588).

Further analysis was conducted following the Hayes' (2013) process for sophisticated mediation analysis, particularly appropriate for testing serial and conditional mediation effects (Yoganathan *et al.*, 2019) as in the case of the present study. Bootstrapping enabled the production of confidence intervals (CI) at 95% level and heteroscedasticity-consistent standard errors (SE). For conditional mediation analysis, low, average, and high levels of the moderator are represented by m-1SD, m, and m+1SD respectively (Hayes, 2013), where 'm' is the mean value and 'SD' is the standard deviation.

Testing for serial mediation shows that the indirect effect is statistically significant ($\beta_{PUPI \to TRUST \to RES \to PI}$=.0095; *p*<.05; CI: .0015, .0250; SE=.0056), as well as the direct effect. Hence, a partial serial mediation is observed of perceived usefulness of product information (PUPI)'s effect on purchase intention via 1) trust in product information, and 2) resistance to

negative information respectively. Thus, H4 is supported. Further analysis shows that the mediation effect, as well as the direct effect, is conditional on environmental self-identity (ENVID). The direct effect of PUPI on purchase intention significantly increases corresponding to increasing levels of ENVID. Conditional mediation analysis reveals that the mediation (*PUPI→TRUST→RES→PI*) is significant for high (β=.0603; *p*<.05; CI: .0164, .1272; SE=.0274) and average levels of ENVID, whereas the direct effect is significant at all levels of ENVID (see Figure 3 for illustration of effects). Therefore, H5 and H6 are also supported.

Insert Figure 3 about here

Discussion and Conclusions

Despite of a growing consumer interest in eco-friendly products, current consumption patterns do not necessarily reflect environmental considerations. This may at least be partially ascribed to the difficulties in identifying eco-friendly product alternatives. The present paper focuses on a recently-discussed approach to disclose environmental product features to consumers, namely, detailed product information. Whilst previous research has mainly explored *if* detailed (environmental) product information items are relevant for consumers (e.g., Hasanzade *et al.*, 2018; Osburg *et al.*, 2016; Ubilava and Foster, 2011), and which characteristics environmental product information must generally fulfil in order to be useful (Osburg *et al.*, 2017), the present research addresses an important gap by developing and testing a model about *how* detailed product information can increase environmentally friendly consumption, both, for the mass market and segments with high environmental self-identity.

The tested model proves that detailed product information increases purchase intention (H1a) and trust (H1c) when it is perceived as useful. The increase in trust is noteworthy since it may encounter consumers general mistrust related to environmental products as a result from environmental scandals and stigmas related to eco-friendly consumption (Johnstone and Tan, 2015; Seele and Gatti, 2017). Surprisingly, though, perceived usefulness of product information did not directly affect the second manifestation of consumer behaviour, i.e., consumers' resistance to negative information (H1b). This observation may be attributable to the study design, in which consumers' general resistance to negative information was assessed. However, this finding does not imply that consumers might potentially become more resistant towards specific negative information items. Further, resistance becomes nonetheless important due to the serial mediation established in this study: perceived usefulness of product information influences purchase intention indirectly through increased trust, which is in turn related to resistance to negative information (H4). This serial mediation identifies how detailed product information affects consumer behaviour and suggests long-term advantages of this information disclosure approach (e.g., Gefen and Straub, 2004; Sichtman, 2007). Trust and resistance to negative information can be understood as constructs, which can also influence consumer behaviour in future situations; therefore, increasing the likelihood of eco-friendly choices not only in the present context but also in subsequent situations where detailed product information is provided. This also implies that the present study supports the assumptions of signaling theory, according to which the disclosure of market signals affects consumer behaviour directly as well as indirectly (Atkinson and Rosenthal, 2014; Connely *et al.*, 2011). The results suggest that environmental signals, which successfully reduce the information asymmetry between producers/sellers and consumers, and consequently result in a higher perceived usefulness, may help to increase eco-friendly consumption.

Furthermore, the results illustrate that detailed product information can be beneficial to target the mass market in addition to the segment of consumers with high environmental self-identity.

Whilst labels have been discussed as particularly influencing the decisions of an environmental segment, detailed information may attract a broader market (Osburg *et al.*, 2016). Indeed, the present paper supports the assumption that detailed product information is relevant for the broader market. The direct effect of perceived usefulness of product information on purchase intention can even be observed for low levels of environmental self-identity, although the effect is stronger the higher an individual's self-identity (H5; Figure 3). The serial mediation, however, could only be established for average and high levels of environmental self-identity (H6), showing that the positive effects on trust and resistance to negative information can particularly be observed for consumers, who identify themselves as eco-friendly individuals. Again, this observation can be explained by signaling theory since consumer uncertainty appears to be particularly reduced by the provision of detailed environmental product information for consumers, who identify themselves as environmental individuals, and therefore look for environmental information. Hence, this paper extends previous research, which revealed that environmental self-identity affects purchase intention (Dagher and Itani, 2014; Werff *et al.*, 2013; Whitmarsh and O'Neill, 2010), by showing that detailed product information can also increase trust, which is in turn related to resistance to negative information. Thus, this study illustrates a range of advantages of providing detailed product information through uncovering its potential short- and long-term effects on consumer behaviour.

Managerial Implications

The present study has several implications for marketing practitioners. First, this study highlights that detailed product information can be a promising tool to encourage eco-friendly consumption. Practitioners should therefore carefully consider if labelling or detailed product information may be more advantageous in order to successfully reduce the information asymmetry between producers/sellers and consumers as well as consumer uncertainty. Such decision may depend on product category and type (e.g., durable good vs. FMCG) as discussed in Osburg *et al.* (2016). At the same time, truthful businesses can use detailed product information to distinguish themselves from competitors showing opportunistic behaviour. Second, product information may be used to encounter some of the current barriers of eco-friendly consumption such as consumer scepticism due to greenwashing attempts or stigmas surrounding the eco-friendly consumer. This applies when detailed product information is perceived as useful, and consequently increases trust and resistance to negative information. Third, and related to this, practitioners need to carefully consider the determinants of high perceived usefulness, which have been explored in previous studies both, generally (Osburg *et al.*, 2017) and product category-specific (e.g., Hasanzade *et al.*, 2018; Osburg *et al.*, 2016). Furthermore, Osburg *et al.* (2016) illustrate a procedure to determine those environmental product information items, which consumers perceive as relevant/useful for their purchase decisions. Fourth, practitioners can be advised to provide detailed product information independent of the targeted consumer segment. The higher the environmental self-identity of the segment appears to be; the more beneficial detailed product information can be. For example, detailed product information can potentially create loyalty through achieving resistance to negative information. Notwithstanding, detailed product information may also be useful for the mass market, which will help to realise eco-friendly consumption more broadly. Previous research suggests that a technologically-enhanced retrieval of detailed product information is a promising disclosure approach, not least as the traceability opportunity can further enhance consumer trust (Appelhanz *et al.*, 2016; Bradu *et al.*, 2014).

Limitations and Suggestions for Future Research

Above all, this study provides further support for the suitability of detailed product information to increase environmentally friendly consumption. As this approach is still in its infancy, further research is needed to fully understand how detailed product information can be successfully applied among different contexts. Furthermore, future research should also address the following limitations of the present study.

Firstly, this study relies on a sample of mainly German university students, and consequently, a sample of young respondents aged between 18 and 35. Future research should therefore prove the generalisability of the conceptual framework by relying on a more diverse sample. Secondly, the survey introduced a wooden dining table as the reference product category. While detailed product information seems to be particularly promising for high involvement purchase decisions, i.e., purchases of durable goods, future studies should also examine to what extent detailed product information can be beneficial for Fast Moving Consumer Goods. Finally, future studies should include a direct comparison of environmental labelling and detailed product information to better understand under what circumstances which information presentation is superior.

Nonetheless, the present study underlines the importance of providing detailed product information to foster environmentally friendly consumption, particularly for young consumers. Furthermore, this work highlights the importance of studying different environmentally friendly consumer outcomes including resistance to negative information, for which it serves as a reliable foundation.

Appendix

Construct/ Items and Cronbach's α	Source*
Environmental self-identity (α=.876) I think of myself as an environmentally-friendly consumer. I think of myself as someone who is very concerned with environmental issues. I would be embarrassed to be seen as having an environmentally friendly lifestyle. I would not want my family or friends to think of me as someone who is concerned about environmental issues.	Whitmarsh and O'Neill (2010)
Perceived usefulness of product information (α=.724) *Detailed product information* do help me to decide which wooden table to buy. help me reduce my overall shopping time. reduce my anxiety to oversee the environmental friendliness of a wooden table. make my life easier because I do not need to spend too much time collecting information about a wooden table. are not valuable. are useful. are important.	Ducoffe (1995); Jamal and Shariffudin (2015)
Trust in product information (α=.868) I trust detailed product information. Detailed product information makes truthful claims. Detailed product information are honest. I believe what detailed product information tell me. *Information conveyed through detailed product information is* honest. truthful. credible. reliable. accurate. factual.	Belonax *et al.* (2007); Soh *et al.* (2009)
Resistance to negative information (α=.786) Negative information about environmentally friendly wood products does not change my general view of it. I readily change my view of environmentally friendly wood products based on negative information about it. Negative information about environmentally friendly wood products has no effect on me. Negative information about environmentally friendly wood products changes the way I think about it.	Eisingerich *et al.* (2011)
Purchase intention (α=.879) If I wanted to buy a wooden table today, I would take a closer look at its environmental friendliness. If I had to buy a wooden table today, I would buy an environmentally friendly table.	Osburg (2016)

* Some scales had to be slightly modified to match the current research context

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Table 1. Reliability and validity statistics for relevant constructs.

	CR	AVE	MSV	ENVID	PUPI	TRUST	PI	RES
ENVID	0.731	0.576	0.435	**0.759**				
PUPI	0.759	0.612	0.17	0.154	**0.783**			
TRUST	0.841	0.521	0.17	0.107	0.412	**0.721**		
PI	0.877	0.781	0.435	0.659	0.341	0.175	**0.884**	
RES	0.781	0.544	0.077	-0.219	-0.277	-0.238	-0.169	**0.737**

NOTES: CR = Composite Reliability; AVE = Average Variance Extracted (√AVE in bold); MSV = Maximum Shared Variance; ENVID = Environmental Self Identity; PUPI = Perceived Usefulness of Product Information; TRUST = Trust in Product Information; PI = Purchase Intention; RES = Resistance to Negative Information

Table 2. Fit indices of the measurement model.

Fit indices	Values	Cut-offs
χ^2/df	1.845	< 2.0
RMSEA	0.052	< 0.08
SRMR	0.045	≤ 0.10
TLI	0.954	≥ 0.90
GFI	0.951	≥ 0.90
CFI	0.966	≥ 0.95

Figure 1. Conceptual framework and hypotheses.
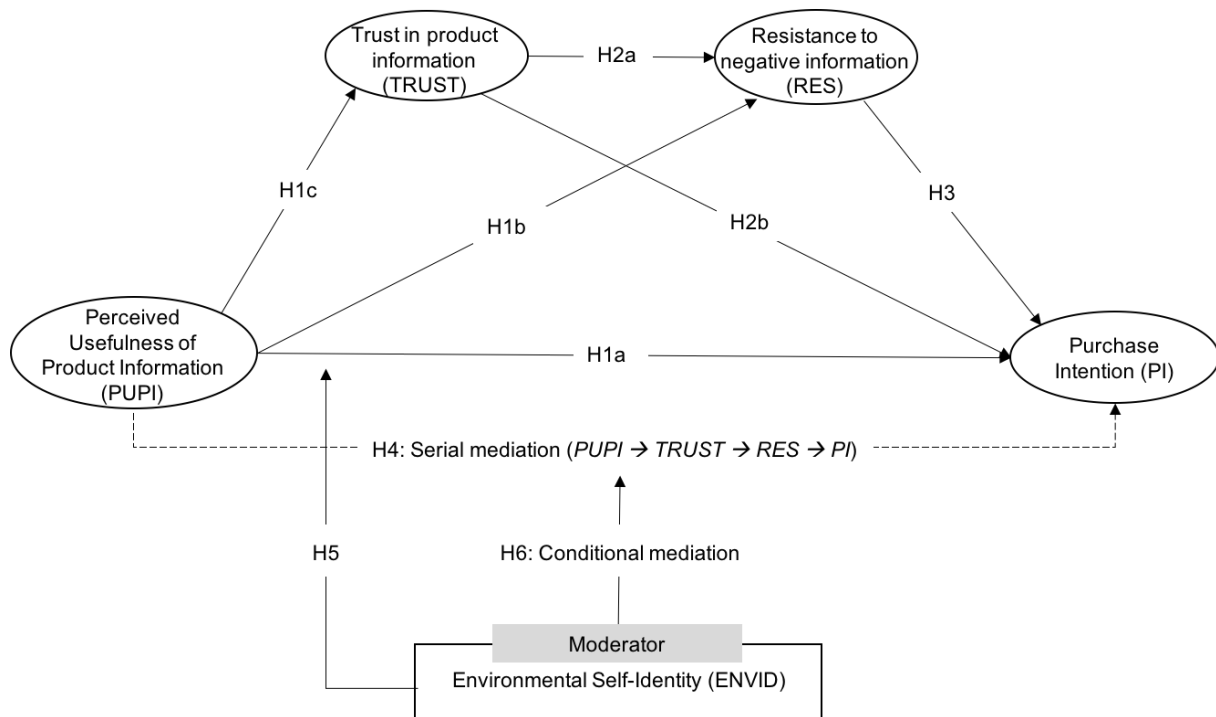
Figure 2. Detailed product information example.

Dining table: Detailed environmental information	
Origin:	Finland
Type of wood:	Pine
Material composition:	Solid wood, particle board, veneer
Percentage of wood from sustainable forest management:	90 %
CO_2-emissions during production:	Very low (40 kg)
Additives:	Clear acrylic paint, Pickling solution
Health effects of additives:	None
Composition of the veneer (recyling):	Medium (60 %)

Figure 3. Conditional effects.
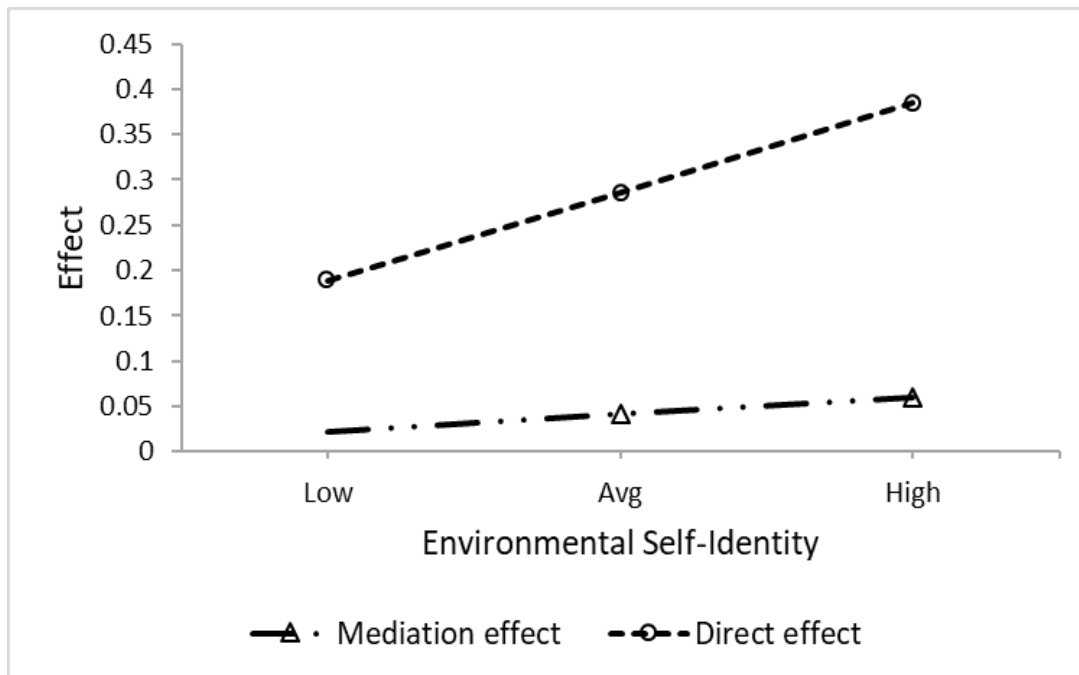
NOTE: Data-points marked with shapes are statistically significant