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Impact of Environmental Sustainability Information and Sustainable Consumption Measures on Consumer Willingness to Pay

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Abstract

The destructive impact of climate change and the significance of sustainable consumption as one mitigating factor emphasize the necessity of societal change for a viable future. This paper investigates sustainable consumption by contrasting consumers' stated willingness to pay for hypothetical chocolate bars with varying environmental sustainability information. To elicit these values, an open-ended question format is employed, with the questionnaire collecting further consumer data. With the obtained sample of 209 participants, findings show that consumers are willing to pay significantly more for environmentally sustainable options. This increase is magnified once certified sustainability information is disclosed. The results further indicate that previously validated measures of general purchasing behavior, perceived consumer effectiveness, environmental attitude, and willingness to pay more for sustainable goods are significant determinants of the increase in willingness to pay. Additionally, education and income are significant factors, while gender did not prove to be relevant. This underlines the price premium placed on green goods and the need for companies to focus on sustainability.

Keywords: *Consumer behavior, behavioral science, environmental sustainability, sustainable consumption, willingness to pay*

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1 Introduction

From an economic perspective, individual consumption is defined as the decision between goods to maximize one's expected utility. Contingent on factors as price and restricted budget, utility itself is assumed to be derived from certain characteristics rather than a complete product, with product decisions revealing consumer preferences (Andorfer & Liebe, 2012). Owed to the significance of consumption to constitute a viable future for following generations, the underlying decision-making process of sustainable consumption is receiving growing research interest (Ghvanidze et al., 2016). Studies showed that intentional and realized sustainable purchases are dependent on several factors (De Carvalho et al., 2015). Specifically, understanding the motivators of an adapted consumption and consumers' evaluations of a product's sustainability attributes proves to be relevant (Andorfer & Liebe, 2012; Jaeger-Erben et al., 2015; O'Rourke & Ringer, 2016). Furthermore, as regular consumption is based on habits seldomly questioned, the relevance of sustainable consumption is underlined by aiming at identifying initiatives that influence attitudes, behavior, and changed consumption patterns (Jaeger-Erben et al., 2015).

Generally, sustainability covers economic, social, and environmental dimensions (De Carvalho et al., 2015). However, this paper focuses on environmental sustainability, defined as "meeting the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them" (Morelli, 2011, p. 6). Furthermore, pro-environmental behavior is referred to as "purposeful action that can reduce a negative impact on the environment" (Li et al., 2019, p. 29) with private sphere environmentalism covering the purchase and use of products considering their environmental impact (Stern, 2000). When considering the product level, green products are defined as goods with low impact on the environment as it is assumed that all products, to a certain extent, pose negative impacts on the environment within their lifecycles (Picket-Baker & Ozaki, 2008).[1]

[1] In this paper, the terms *sustainable*, *environmentally friendly*, *environmentally sustainable*, *environmentally responsible*, *pro-environmental* and *green* are used synonymously.

It is evident that human society has to undergo transformational changes in technological, social as well as behavioral dimensions to mitigate the disastrous impacts of climate change by moderating the effects of declining biodiversity and addressing the economic and social cost of passiveness toward environmental issues (Ceschin & Gaziulusoy, 2016). The urgency of change is emphasized by the Intergovernmental Panel on Climate Change having reported the necessity to attain a net zero in global carbon dioxide emissions by 2050 to prevent an excess of the 1.5°C global warming target (Intergovernmental Panel on Climate Change, 2018). Additionally, the European Parliament declared climate emergency in 2019 and stressed the commission's necessary commitment to attain a climate-neutral state within the European Union by 2050 (European Parliament, 2019). The binding factor of the above-mentioned climate neutrality is underlined by the recently passed climate law, giving individuals and businesses legal certainty and predictability to implement according measures for this transition (European Parliament, 2021).

Listed as one of the Sustainable Development Goals by the United Nations (2021), one area of modification involves sustainable consumption and production patterns. Thus, it is vital to examine the sustainability dimension of consumption with private household consumption generating 72 percent of global greenhouse gas emissions (Hertwich & Peters, 2009). This indicates the necessity to focus on altering consumption behavior on the demand side in addition to supply-side developments through technologies and policies (Dubois et al., 2019). Given the individual's impact on the environment and the positive implication of pro-environmental consumption on quality of life, researchers are increasingly interested in identifying motivating variables and barriers for consumption changes at the individual level (Dubois et al., 2019; Li et al., 2019). However, defining the motivators of pro-environmental behavior proves to be complex. Research provided contradicting results when investigating factors ranging from demographic to economic and cultural dimensions, environmental knowledge, awareness, and

environmental attitude (Li et al., 2019). Previous findings also showed that knowledge about issues, attitudes, and an individual's sense of responsibility are important factors (Hines et al., 1987; Li et al., 2019).

To date, several studies have investigated the above-mentioned factors and their impact on green consumption intentions and actual behavior by applying distinct methodologies. Moreover, the willingness to pay (WTP) for certain sustainable products and product attributes has been the subject of valuation studies. A substantial number of these studies focused on food products as the consumers' degree of familiarity is considered high with low involvement, allowing for realistic estimations (Haws et al., 2017; Vecchio & Annunziata, 2015). However, to the best of my knowledge, and albeit sustainable consumption is gaining research momentum, no study has been conducted on the immediate effect on consumers' elicited WTP for a food product once information on the good's environmental sustainability dimension is disclosed. Therefore, this paper aims at providing valuable insights on the instantaneous impact on WTP combined with the objective of connecting this impact to previously identified explanatory variables of sustainable consumption.

This paper is structured as follows. Section 2 reviews existing literature, describes relevant findings within the area of environmentally sustainable consumption, and derives the research hypotheses based on the context provided. The following section introduces the methodology applied with section 4 describing the obtained empirical results. Subsequently, the results are discussed and limitations of the study as well as future research potential are outlined. Section 6 concludes the paper.

2 Literature Review

2.1 Demand and Supply Perspective on Environmental Sustainability

Chiu et al. (2020) addressed sustainable consumption by investigating individual consumer and collective cluster behaviors, with findings indicating the need for producers to respond to shifting consumer preferences and purchasing behavior. Companies have been forced to reconsider production and marketing practices owed to the trend toward sustainability (Konuk, 2019). Moreover, the producer's responsibility to develop greener goods is emphasized given the anticipation of consumer reactions (Chiu et al., 2020). However, it is vital to consider that a more sustainable production does not necessarily and instantaneously motivate sustainable consumption choices (Chiu et al., 2020). Shuai et al. (2014) indicated that the purchase of low-carbon goods can be attributed to the tragedy of the commons. Considering that the individual interest advocates buying cheaper, conventional products, this behavior does not maximize collective interest from a societal perspective. Solving the dilemma would require the alignment of individual and social interests (Shuai et al., 2014). Owed to the individual's impact on the environment, researchers aimed at increasing awareness about environmental sustainability issues and the influence the public exerts (Li et al., 2019). Nevertheless, to attain social cooperation – the purchase of green goods in this context – Shuai et al. (2014) emphasized the importance of grasping consumers' WTP and influencing factors.

2.2 Determinants of Environmentally Sustainable Consumption

Pro-environmental consumption increasingly represents a relevant area of research with interest in identifying underlying determinants comprising internal factors as, for instance, demographic and psychological attributes as well as external factors, such as social norms (Li et al., 2019). It is crucial to mention that identifying the most pertinent predictors is difficult as several factors were found to considerably impact sustainable consumption.

Environmental Concern and Informedness. Schuhwerk and Lefkoff-Hagius (1995) focused on sustainable consumption intentions and discovered that a higher environmental concern results in an amplified probability of buying green goods. Furthermore, a more pronounced environmental concern leads to an increased stated WTP for sustainable products (Cason & Gangadharan, 2002). Adding to this, López-Mosquera et al. (2015) found an individual's interest in environmental problems as well as corresponding informedness to represent significant predictors of responsible purchases.

Environmental Attitude. Moreover, variables concerning environmental attitudes and beliefs proved to be of the most relevant sustainable purchase predictors (López-Mosquera et al., 2015). People exposing a higher degree of pro-environmental attitudes and beliefs imply a greater likelihood of buying green products, overruling the opportunity cost of green products with higher price (López-Mosquera et al., 2015; Pickett-Baker & Ozaki, 2008; Schlegelmilch et al., 1996; Tseng & Tsai, 2011). Furthermore, Shuai et al. (2014) indicated differing WTP values for low-carbon products according to individual awareness and attitude.

Perceived Consumer Effectiveness. Research showed that albeit individuals indicate an awareness of environmental problems, they often declare their lifestyle not to pose damage to the environment (López-Mosquera et al., 2015). This is in line with prior research indicating that although environmental concern is expressed, ambivalent attitudes toward green goods are observed, owed to variables as perceived consumer effectiveness (PCE) and skepticism when it comes to sustainability statements – both being significant predictors of corresponding responsible consumption (Chang, 2011; Ellen et al., 1991; Lee & Holden, 1999). PCE in this context is defined as the perceived individual environmental impact (Chang, 2011).

Demographic and Socioeconomic Factors. Psychological factors provide more clarification of pro-environmental behavior than demographic or external factors (López-Mosquera et al., 2015). These findings are supported by Schlegelmilch et al. (1996),

who stated that demographic and socioeconomic factors only provide little explanation. Moreover, when investigating prior studies on environmentally responsible purchasing behaviors, López-Mosquera et al. (2015) found that psychological aspects such as environmental attitudes, beliefs, and knowledge are significant for explaining according purchases with demographic and socioeconomic factors being less relevant. Nevertheless, Shuai et al. (2014) found that higher education and personal income levels positively influence consumers' WTP as well as the frequency of green purchases. Gender either exerted an impact on green consumption or had no impact at all (López-Mosquera et al., 2015; Shuai et al., 2014).

2.3 Implications of Premium Pricing and Certificates on Sustainable Consumption

When considering the impact of sustainable product pricing, prior research provided contradicting results. Findings indicated that the premium price of green goods poses a barrier to sustainable consumption when analyzing actual behavior data (Yamoah & Acquaye, 2019). Smith et al. (2007), however, found a positive relationship with purchase behavior. This discrepancy is supported by a study within the social sustainability dimension having estimated the WTP for fair trade coffee. Andorfer and Liebe (2012) discovered that, albeit price negatively affects purchase decisions, consumers are willing to pay a premium for ethical attributes of a product. Further, consumers increasingly voice their willingness to pay more (WTPM) for green goods (Laroche et al., 2001). Universally, healthier food is associated with higher prices, suggesting that a product's health is a function of its price – exemplifying food choice heuristics as well as the influence of pricing on product perceptions (Haws et al., 2017).

In addition to that, Drichoutis et al. (2016) stated that consumers put premiums on certified climate-neutral food, concluding that environmental sustainability certificates impact consumption. In general, certification labels aim at developing trust in sustainability attributes of products by disclosing corresponding information (Ruggeri et al., 2021). When investigating the influence of revealing carbon dioxide emission information of food products on consumer

choices, Motoshita et al. (2015) discovered that levels of consumer awareness regarding carbon dioxide emission responsibility and their intention to alter their behavior by reducing such were the most adequate influences of their willingness to reduce individual emissions.

2.4 Attitude-Behavior Gap as Impediment to Sustainable Consumption

It is vital to mention that although consumers express environmental concern, environmental attitude, and consumption intentions, the principle of the attitude-behavior gap implies no direct translation into sustainable behavior (Chiu et al., 2020; Li et al., 2019; Luchs et al., 2010). Despite a growing interest in green goods, this gap contributes to sustainable food still catering to a niche market, with a rising but low market share compared to conventional food (Vermeir & Verbeke, 2006; Yamoah & Acquaye, 2019). Thus, theories from the discipline of behavioral economics prevail significantly as consumer behavior can be influenced toward an increased degree of sustainability with experts advocating responsible choice architectures to reduce barriers to good decisions in the future (Chiu et al., 2020; Thaler, 2021).

2.5 Global Pandemic as Potential Catalyst for Sustainable Consumption

According to social science, disasters can catalyze social change (Cohen, 2020). When considering current circumstances, it was found that the COVID-19 pandemic positively influenced environmental awareness as well as sustainable consumption (Severo et al., 2021). Moreover, according to the United Nations (2021), we are currently experiencing a "historic window of opportunity to design a transformative COVID-19 recovery strategy to build sustainable and resilient economies and societies", further stating that it is "time to fully embrace the decoupling of economic growth from environmental degradation, a reduction in carbon emissions [...] and the promotion of sustainable lifestyles" (p. 50). Researchers further advocated the progressive incorporation of sustainable consumption into policies, contributing to a viable future (Cohen, 2020; Severo et al., 2021) – again highlighting the topic's relevance.

2.6 Research Hypotheses Development

This paper aims to investigate whether and to what extent the provision of environmental sustainability information impacts consumers' stated WTP of a product. Moreover, based on the aforementioned research results, the influence of disclosing sustainability data on WTP is to be explored according to verified measures previously proven to be significant predictors of sustainable consumption or corresponding intentions. To address the research question, several hypotheses are proposed as shown in Figure 1 and outlined below.

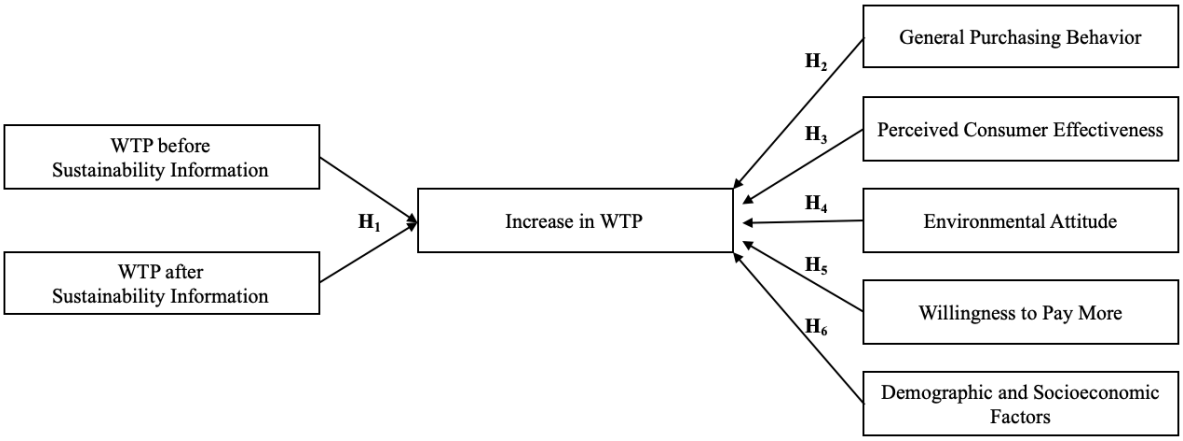

Figure 1. *Research Hypotheses Overview*. Source: Own Creation.

Building on prior studies that have reported a positive WTP for environmentally friendly goods having used revealed as well as stated valuations for a variety of goods (see Andorfer & Liebe, 2012; Drichoutis et al., 2016), it is expected to replicate these findings by obtaining an increased stated WTP of consumers induced by disclosing environmental sustainability information on a hypothetical chocolate bar as the research object. This presumption is incorporated in the following hypothesis:

H1. *The stated WTP will significantly increase once environmental sustainability information is disclosed.*

Additionally, considering the numerous studies having investigated the impacts of distinct variables and measures on sustainable consumption and intentions, four relevant measures were selected to be considered in this study. These measures are utilized to analyze

if the hypothesized change in WTP can be attributed to one or several of them. In the following, the hypotheses are derived with the subsequent section also describing the chosen measures.

As stated general purchasing behavior (GPB) forms part of the environmental consciousness dimension (Schlegelmilch et al., 1996), this study incorporates a related measure to show if stated behavior materializes in an increased WTP after sustainability information disclosure:

H2. *GPB is a significant predictor of the increase in WTP.*

Moreover, PCE, previously identified as an underlying motivator of green consumption and mediator between environmental awareness and corresponding behavior, is analyzed (see Chang, 2011; Ellen et al., 1991; Lee & Holden, 1999):

H3. *PCE is a significant predictor of the increase in WTP.*

As attitudinal factors were found to be significant predictors of sustainable purchases (Schlegelmilch et al., 1996), this study implements the New Ecological Paradigm (NEP) measure by Dunlap et al. (2000) as a proxy for environmental attitude:

H4. *Environmental attitude is a significant predictor of the increase in WTP.*

As stated WTPM for green goods was identified as evidence for the rise in ecologically friendly consumer behavior (Laroche et al., 2001), this study aims at exploring whether an individual's stated willingness also unfolds in measured WTP:

H5. *WTPM for sustainable goods is a significant predictor of the increase in WTP.*

Lastly, as the impact of demographic and socioeconomic data has been subject of several studies returning contradicting results (see López-Mosquera et al., 2015; Schlegelmilch et al., 1996; Shuai et al., 2014), this study further analyzes these factors, seeking to replicate findings of a less relevant predictory influence on WTP change:

H6. *Demographic and socioeconomic factors are no significant predictors of the increase in WTP.*

3 Research Method

This section introduces the methodological approach employed to address the hypotheses previously delineated. First, hypothetical chocolate bars as products of interest are justified. Subsequently, the questionnaire design is described, covering the method utilized for eliciting WTP valuations, the sustainability measures selected to collect individual sustainability data as well as the demographic and socioeconomic information gathered, eventually enabling inferences about hypothesized differing WTP statements. Finally, the obtained sample is outlined.

3.1 Hypothetical Chocolate Bars as Research Object

Generally, food decisions are impacted by decision-making heuristics given the substantial number of decisions made each year, making food a frequent subject of behavioral science studies (Haws et al., 2017). Knetsch (1989) investigated the endowment effect by eliciting WTP and willingness to accept values for candy bars. Having implemented an experimental auction methodology, Vecchio and Annunziata (2015) selected a chocolate bar as the product of interest given that bids converge faster when analyzing familiar products. Although having applied different methodological approaches, these studies were considered when selecting the research object of this study. Moreover, it was taken into account that energy-conserving products can distort results when studying pro-environmental consumption as consumers are often economically motivated in that domain (Schlegelmilch et al., 1996). Thus, food, and specifically, chocolate bars were selected as reference products – albeit hypothetical.

The chocolate market itself has transformed to meet shifting market demands. Studies investigated consumers' respective purchasing behaviors with increasing interest toward sustainability attributes and results showed that certified, environmentally friendly chocolate is commonly valued higher than conventional options (Del Prete & Samoggia, 2020).

Interestingly, fair trade certificates elicited the highest WTP among consumers, with sustainable product packaging improving the product's quality perception (Del Prete & Samoggia, 2020).

Given the environmental sustainability focus of this study, a chocolate bar of *the nu company* was used as reference when providing participants with environmental information about a hypothetical, sustainable chocolate bar. Well aware of the impact of private consumption and aiming at positive food consumption, *the nu company* produces and sells certified vegan and organic products in plastic-free packaging. Besides focusing on a sustainable supply chain, the firm plants one tree for every product sold, compensating for the production emissions of their regular chocolate bar (the nu company, 2021).

3.2 Questionnaire Design

The questionnaire utilized, consisting of three parts and comprising 12 questions in total, is described in what follows and can be found in Appendix A.

3.2.1 Open-Ended Question Format to Elicit Stated WTP

To audit the value of products or services, an accurate estimation of consumers' WTP is crucial. Methods for eliciting WTP values are categorized in direct or indirect approaches and whether they return hypothetical or actual results. Numerous marketing researchers advocate the direct format of consumers stating their WTP for a good as, for instance, by employing an open-ended question approach (Miller et al., 2011). Although hypothetical methods can generate hypothetical bias owed to the valuation task's nature, researchers found that they can indeed result in accurate references for pricing (Miller et al., 2011). The open-ended question approach requires respondents to state the maximum amount of money they would be willing to pay for a specific good, previously proven to be valid when investigating the relationship of WTP and WTP determinants, such as income (Donaldson et al., 1997). Moreover, formulating questions in open-ended or dichotomous choice formats did

not significantly differ in estimated hypothetical WTP (Loomis et al., 1997). Therefore, the open-ended question format was selected to obtain WTP values for three hypothetical chocolate bars, investigating the differences when comparing a conventional and two sustainable options.

3.2.2 WTP Elicitation for Hypothetical Chocolate Bars

To analyze the WTP and its development, three consecutive scenarios were evaluated with differing information provided about the hypothetical chocolate bars' attributes.

In all three cases, respondents were given a reference price of €.89 for a conventional option. Given *the nu company*'s German origin and price of €1.95 for a 40.00g bar, this reference price was calculated based on the price of a chocolate bar by Germany's most popular chocolate manufacturer, Milka, charging €.79 for a 36.50g chocolate bar (Mondelez, 2021; VuMA Touchpoints, 2020). To allow for an accurate comparison with the sustainable choice, the price per gram was calculated, resulting in a hypothetical price of €.87 price for the conventional chocolate bar example, rounded up to €.89 to mimic a common price pattern (Choi et al., 2014).

In the first scenario, participants are asked to indicate their maximum WTP for a conventional chocolate bar. In scenario 2, it is simply indicated that the chocolate bar to state their WTP for is an environmentally sustainable option. Lastly, participants are given detailed information about the certified environmental sustainability dimension of the chocolate bar, replicating the previously reported product attributes of *the nu company*. These three scenarios were created to allow for comparisons between conventional, sustainable, and certified sustainable chocolate bars, are displayed in Table 1 and can be found in Appendix A.

	WTP 1	**WTP 2**	**WTP 3**
Hypothesis Addressed	H1	H1	H1
Research Object	Chocolate Bar	Chocolate Bar	Chocolate Bar
Sustainability Dimension	Conventional Product	Environmental Sustainability Mentioned	Certified Information Provided

Table 1. *WTP Elicitation Scenario Overview*. Source: Own Creation.

3.2.3 Environmental Sustainability Measures

To address the sustainability aspect, four previously validated scales were included in the questionnaire, providing insights into different dimensions of individual environmental sustainability. Specifically, and as described below, personal evaluations were measured on *GPB*, environmental attitude based on the *NEP* scale, *PCE*, and stated *WTPM* for sustainable goods. Respondents indicated their level of agreement for, in sum, 24 corresponding items.

A 7-point Likert scale (1 = *Strongly Disagree*, 7 = *Strongly Agree*) was selected to measure participants' level of agreement with the statements given that the frequency of respondents selecting the neutral answer is lower than when providing fewer options (Matell & Jacoby, 1972). All applied measures returned a Cronbach's Alpha above the crucial value of .70, indicating reliable measurement (Hair et al., 2014, p. 215). In the following, the four scales are introduced in detail. Further, Appendix B lists the scales and according statements as applied by previous studies and this paper.

General Purchasing Behavior. Used as the first measure, the GPB scale comprises three statements aiming to assess a consumer's stated environmentally friendly purchase behavior. It was developed by Schlegelmilch et al. (1996) and provided a Cronbach's Alpha of $\alpha = .82$ when used for a general public sample, indicating sufficient measurement reliability.

Perceived Consumer Effectiveness. The PCE scale was previously applied in a study by Kang et al. (2013) as PCE was found to be a crucial factor of real green behavior, emerging from environmental concern. It consists of three items and previously returned $\alpha = .85$.

New Ecological Paradigm. The NEP scale by Dunlap et al. (2000) is a common and widely used measure of environmental beliefs, reasonably adopted as an indicator of attitudes and beliefs toward the environment. A high score obtained by individuals thus indicates an amplified pro-environmental attitude. The scale consists of 15 items, having returned a Cronbach's Alpha of $\alpha = .83$ (Dunlap et al., 2000).

Willingness to Pay More. The fourth measure included in this study is the so-called WTPM scale, indicating whether individuals voice their readiness to pay more for environmentally sustainable goods. This disposition is measured by three items, defined as reliable with a Cronbach's Alpha of $\alpha = .84$ (Laroche et al., 2001).

3.2.4 Demographic and Socioeconomic Data

Lastly, the questionnaire collected demographic and socioeconomic details about participants to test if these factors exert influence on WTP with the applied methodology. The data gathered comprises age, gender, the highest level of education, average monthly net income, employment status, and nationality.

3.3 Data Collection and Sample Description

The questionnaire at hand was created by using the Qualtrics software. After having conducted a pre-test with peers and implementing relevant feedback, the final version was distributed. Before starting the survey, participants were informed about the anonymity of their answers.

This study generated 209 valid responses. Out of all respondents (n = 209), 53.60 percent were female with the remaining 46.40 percent being male. As for their age, 48.80 percent were younger than 25 with 44.50 percent ranging between 25 to 30 years and 6.70 percent being older than 30. In terms of their highest level of education attained, 22.01 percent of the participants finished high school, while 50.24 percent previously obtained a bachelor's degree, 26.79 percent a master's degree, and 0.96 percent a doctorate or equivalent diploma. Considering their average monthly net income, 11.48 percent indicated an income below €500, with 30.14 percent earning between €500 and €1,000. 25.84 percent stated an income between €1,000 and €1,500, 14.83 percent between €1,500 and €2,000, and the remaining 17.70 percent earned more than €2,000 per month. While the majority of the respondents were students (61.25

percent), 34.93 percent were employed, 2.87 percent self-employed and two individuals unemployed or have selected the *other* option. Among the 209 respondents, 22 nationalities were represented with the majority being German (48.33 percent), followed by Portuguese (15.31 percent), Dutch (11.00 percent), and Italian (6.70 percent). Appendix C provides the descriptive statistics with Appendix D disclosing the obtained survey answers.

4 Results

4.1 Descriptive Statistics of Stated WTP Valuations

All following analyses were performed with the Statistical Package for the Social Sciences software. When analyzing the obtained mean WTP in all three scenarios, it is evident that an increasing degree of environmental sustainability induced higher values. For the conventional chocolate bar in scenario 1, a mean WTP of €1.40 was obtained, indicating a mean well above the reference price of €.89. After stating that consumers are to evaluate their maximum WTP for an environmentally sustainable chocolate bar, the mean reached €1.88, resulting in an increase of €.48. In scenario 3, after providing information on the certified environmental sustainability dimension of the chocolate bar, the mean amounted to €2.19. These results indicate that the sustainability information indeed impacted stated WTP for the hypothetical good. Table 2 shows the corresponding descriptive statistics.

Scenario	WTP	Median [€]	Mean [€]	SD [€]	n
Conventional	WTP 1	1.10	1.40	.63	209
Sustainable	WTP 2	1.56	1.88	.85	209
Sustainable with Information	WTP 3	1.99	2.19	.93	209

Table 2. *Descriptive Statistics of Stated WTP.* Source: Own Computation.

4.2 Statistical Test Results of Stated WTP Valuations

So as to investigate *H1*, the three stated WTP valuations were utilized. First, to be able to infer about an increased WTP when comparing conventional and sustainable scenarios, all three variables (WTP 1, WTP 2, and WTP 3) were tested for normality by conducting a Shapiro-Wilk Test. Results showed that for all three WTP variables, the null hypothesis of a normal distribution can be rejected at $p < .001$ (Appendix E.1). Therefore, to examine significant differences between the WTP valuations, three non-parametric Wilcoxon Signed-Rank Tests were conducted. This methodology can be used to compare scores when individuals are exposed to at least two conditions, requiring matched samples but not assuming normally distributed data. Being able to reject the test's null hypothesis would indicate a statistically significant difference between two paired values (Anderson et al., 2010). Given the alignment with the methodological approach of this study, this test was conducted to indicate if significant differences were obtained when comparing WTP 1 with WTP 2 and WTP 3 as well as when doing so with WTP 2 and WTP 3. Results showed that by analyzing mean ranks, WTP 2 exceeded WTP 1 for 193 of 209 participants (92.34 percent of the sample). In the case of WTP 1 and WTP 3, the latter was higher in 199 of the cases (95.22 percent). Finally, when exploring WTP 2 and WTP 3, 185 individuals stated a higher WTP 3. At $p < .001$, the null hypothesis could be rejected for all three tests, reinforcing significant differences in WTP statements. Moreover, when considering the effect size introduced by Cohen (1988), all three tests returned a large effect size as reported in Table 3, with the largest effect size of $r = .85$ ($Z = -12.233$, $N = 209$) obtained when comparing WTP 1 with WTP 3. The formula for calculating the effect size r of a Wilcoxon Signed-Rank Test is defined as follows (Fritz et al., 2012):

$$r = \frac{Z}{\sqrt{N}} \tag{1}$$

Further detailed statistical test results are to be found in Appendix E.2.

Comparison	n	n WTP 2 > WTP 1	n WTP 3 > WTP 1	n WTP 3 > WTP 2	Z	p	r
WTP 1 / WTP 2	209	193	-	-	-12.048	<.001***	.83
WTP 1 / WTP 3	209	-	199	-	-12.233	<.001***	.85
WTP 2 / WTP 3	209	-	-	185	-11.790	<.001***	.82

Significance at: ***p < .01; **p < .05; *p < .10

Table 3. *Wilcoxon Signed-Rank Test Results.* Source: Own Computation.

The results show statistically significant differences in all three WTP comparison scenarios, indicating a meaningful and instantaneous impact of disclosing environmental sustainability information on stated WTP for a hypothetical chocolate bar. This is the case when comparing the conventional option (WTP 1) with one solely communicated as sustainable (WTP 2) and an option providing certified sustainability information (WTP 3). Notably, this also holds true when analyzing the increase in WTP from stated sustainability (WTP 2) to communicated certified sustainability information (WTP 3). Thus, *H1* is supported.

In the following, results are presented with which *H2*, *H3*, *H4*, and *H5* are addressed. Having returned the largest effect size and providing information on the impact of communicating information about the certified environmental sustainability dimension of a good, WTP 1 and WTP 3 valuations were used for the statistical tests conducted. As the aim is to explain the significant increase in consumers' stated WTP, the survey insights generated by the implemented sustainability measures were used. To achieve approximately continuous variables according to the applied 7-point Likert scale (1 = *Strongly Disagree* to 7 = *Strongly Agree*, with even-numbered items of the NEP scale being coded in reverse order), a cumulative score for each of the measures was calculated based on the participants' level of agreement, as commonly practiced by researchers (Sullivan & Artino, 2013).

Firstly, a correlation analysis was conducted to test for interdependence of the applied scales, based on the scores determined. Results showed that all four measure scores expose a statistically significant correlation as shown in Table 4, being in line with findings of previous studies (Laroche et al., 2001).

	GPB	**PCE**	**NEP**	**WTPM**
GPB	1	.639***	.441***	.677***
PCE	.639***	1	.420***	.609***
NEP	.441***	.420***	1	.481***
WTPM	.677***	.609***	.481***	1

Significance at: ***p < .01; **p < .05; *p < .10

Table 4. *Correlation Matrix of Sustainability Measures.* Source: Own Computation.

Given the indicated multicollinearity of the variables, linear regression analysis assumptions could not be met in order to analyze the increase in WTP (Daoud, 2017). Thus, to test if the applied sustainability measures influenced the induced WTP change, the scores of all four measures were clustered into two categories according to their respective median, indicating a *low* or *high* level for each measure. By having performed a median split, as commonly done by researchers (DeCoster et al., 2011), participants were allocated to two different groups for each measure – splitting the respondents at a score of 16.00 for GPB, at 17.00 for PCE, 85.00 for NEP, and at the median of 17.00 for the WTPM scale. Appendix E.3.1 shows the descriptive statistics of the measures' scores.

To test for significant differences between both groups for the respective measures when investigating the increase in consumers' stated WTP, four non-parametric Mann-Whitney Tests were conducted. This method was selected due to the fact that the increase in WTP was not normally distributed – as indicated by the corresponding Shapiro-Wilk Test result ($W = .893$, $p < .001$). Further, the prerequisites of a Mann-Whitney Test were met, being a continuous dependent variable, two independent groups for the independent variable as well as the

independence of observations, indicating that no participant can be present in both groups used (Nachar, 2008). Holding true for all four measures – GPB, PCE, NEP, and WTPM – test results showed a significant difference in the increase of consumers' WTP when comparing participants that scored low or high on the respective scales. Moreover, in light of the generated effect sizes, WTPM revealed the largest effect size (Z = -6.039, N = 192, r = .44), generally defined as medium (Cohen, 1988, p. 80). Thus, it can be stated that respondents having indicated an increased WTPM also showed a greater increase in their WTP once the certified sustainability information was provided (U = 2283.50, p < .001). Nevertheless, this conclusion applies for all sustainability measures used in this study. Appendix E.3.2 shows the detailed Mann-Whitney Test results. With the above-mentioned findings, *H2*, *H3*, *H4*, and *H5* are supported, showing that the applied sustainability measures are significant predictors of the increase in an individual's WTP once aware of a product's certified sustainability aspect.

Moreover, addressing *H6*, the variables of gender, highest level of education and average monthly net income were considered to infer about their impact on the increase in stated WTP. Concerning gender, a Mann-Whitney Test was conducted given the allocation to solely two genders, as indicated by all respondents. The null hypothesis of an equal distribution of the difference in WTP could not be rejected (U = 5103.00, p = .450). Thus, no significant difference between the sexes could be detected (Appendix E.4.1). To analyze the other two variables with ordinal data and five respective groups, two non-parametric Kruskal-Wallis Tests were conducted (MacFarland & Yates, 2016). Results showed that at a significance level of .05, significant differences in the mean ranks of the increased WTP are evident across at least one pair of groups, for level of education and income, respectively (Appendices E.4.2 & E.4.4). Corresponding pairwise tests for the level of education showed evidence of a difference between high school as well as bachelor and master graduates, and between the high school and doctorate groups (Appendix E.4.3). When investigating the different income level groups, the

only significant difference was found between those earning €500 to €1,000 and those having a monthly net income higher than €2,000 (Appendix E.4.5). Taking into account the aforementioned results, *H6* can only be partially supported as education and income were found to significantly impact the increase in WTP as opposed to gender.

4.3 Additional Insights Generated by Survey Results

Notably, 97.13 percent of all participants indicated their agreement with the claim that humankind will face a major ecological catastrophe if things continue at their current course. Moreover, 94.74 percent selected an answer above the neutral Likert-scale option and thus, agreed with the effectiveness of trying to preserve the environment as an individual. It is also worth mentioning that 96.17 percent indicated to usually choose the environmentally friendly option of a good if one of a comparable price is available. However, only 46.89 percent would do so regardless of the price, resulting in a decrease of 49.28 percent. Furthermore, 71.77 percent stated their intent to discover a product's environmental sustainability performance prior to purchasing it. Evaluating the responses obtained for the WTPM measure, 93.30 percent of all respondents indicated their hypothetical consent to generally pay ten percent more for sustainable goods, while a comparably lower share of 62.68 percent agreed to pay ten percent more taxes for an environmental cleanup program.

5 Discussion

This study explored sustainable consumption behavior by evaluating consumers' stated WTP for three hypothetical chocolate bars differing in their level of sustainability information provided. Having elicited their corresponding values through employing an open-ended question format, the impact of provided sustainability information on WTP was examined. Additionally, the influence of an individual's disposition toward environmental sustainability, measured by according sustainability measures, was analyzed on the increase in one's WTP when comparing values for the conventional and certified sustainable options.

5.1 Theoretical Implications

Given the significant increase in consumers' stated WTP after having disclosed information on the product's environmental sustainability aspect, it is observed that individuals indeed are assigning a price premium to green products. This observation was made when comparing a conventional chocolate bar with one simply defined as environmentally sustainable as well as when doing so with these two options and the option providing further information on its certified sustainability. This result supports *H1* of this study and replicates previous findings of Andorfer and Liebe (2012) as well as Del Prete and Samoggia (2020), who discovered a premium placed on sustainability product attributes. Moreover, with disclosing certified information exerting a significant effect on WTP – even when comparing values with the chocolate bar defined as environmentally sustainable – these results are in line with the findings of Drichoutis et al. (2016), having claimed a premium assigned to goods certified as climate-neutral. Furthermore, survey results replicate previous literature findings suggesting a barrier to sustainable consumption owed to the price premium (Yamoah & Acquaye, 2019), as the majority of respondents stated to buy sustainable alternatives of similar prices, but a substantially lower percentage stating to do so even if prices differ.

Secondly, when analyzing the statistical test results obtained that support *H2*, *H3*, *H4*, and *H5*, it becomes evident that the applied measures of GPB, PCE, NEP, and WTPM indeed serve as indicators for the increase in WTP valuations when examining the increase from WTP 1 to WTP 3. Thus, it is assumed that high levels of stated sustainable GPB, consumers' PCE, their environmental attitude represented by the NEP scale as well as their stated WTPM significantly impact the increase in WTP. These findings are aligned with previous studies concerning environmental attitude as a predictor of sustainable purchases (López-Mosquera et al., 2015; Pickett-Baker & Ozaki, 2008; Schlegelmilch et al., 1996; Tseng & Tsai, 2011). This

further counts for PCE as a significant explanatory variable of corresponding consumption (Chang, 2011; Ellen et al., 1991; Lee & Holden, 1999).

Lastly, the impact of demographic and socioeconomic factors was studied. Gender did not prove to be an explanatory variable of the increase in stated WTP, replicating previous findings of demographic variables being less influential on sustainable consumption (López-Mosquera et al., 2015; Schlegelmilch et al., 1996). However, *H6* could only be partially supported as differing levels of education and monthly net income exposed statistically significant differences in the mean ranks of the increase in WTP. These results support prior literature of López-Mosquera et al. (2015) and Shuai et al. (2014), who found a positive relationship of education and income with WTP and sustainable product purchases.

5.2 Practical Implications

In general, it is evident that sustainable production will become increasingly important, with sustainable consumption having experienced a surge in public attention in recent years, the force of the COVID-19 pandemic as a catalyst, and with binding factors of corresponding laws, international environmental goals as well as consumer preferences.

The above-mentioned findings might be defined as significant information for food suppliers, having faced the increasing trend of sustainability for several years already (Konuk, 2019). Inevitably, to ensure conformity with new sustainability laws, companies will move toward sustainable production practices. Moreover, as consumers define demand, investigating explanatory factors of sustainable consumption patterns is a crucial aspect that can accelerate a company's adoption of sustainable practices and the resulting supply of sustainable food products. Regarding the purchase of food as a habitual and low-involvement task for consumers and the evident trend toward sustainability, companies have to expand and effectively market their sustainable product portfolio to be considered by consumers becoming increasingly aware of sustainability and their responsibility to constitute a viable future. The information provided

by this study, supporting findings of prior studies, might have an impact on (1) a company's sustainable product design and production, (2) effective marketing based on product differentiation and focusing on explanatory factors of sustainable consumption such as PCE, and (3) further investigation of consumers' WTP as indicators for an adequate price premium on environmentally friendly goods.

5.3 Limitations

This study experiences several limitations and therefore opens further future research potential. Albeit the open-ended question format is considered a valid approach for eliciting WTP values from consumers, several other researchers prefer indirect methods (Miller et al., 2011). The choice-based conjoint analysis, for instance, allows for the WTP calculation based on consumer choices between numerous product variations and the possibility to select none of them (Louviere & Woodworth, 1983). Moreover, to elicit actual WTP valuations, the incentive-compatible, indirect method of Becker, DeGroot, and Marschak and the incentive-aligned choice-based conjoint surpass choice-based conjoint and open-ended question formats concerning validity (Becker et al., 1964; Kahneman et al., 1990; Miller et al., 2011). Moreover, when eliciting hypothetical values, as done with the open-ended question approach, hypothetical bias can occur (Miller et al., 2011). Furthermore, as behavior impacting the environment is defined as morally concerned (Carlsson & Johansson-Stenman, 2012), eliciting WTP for a sustainable good can be subject to respondents aiming at satisfying social norms instead of indicating their real preferences (Ruggeri et al., 2021). In addition to the hypothetical nature of the WTP elicitation, the attitude-behavior gap as impeding variable of actual sustainable consumption should also be considered (Vermeir & Verbeke, 2006). Lastly, this study does not contribute to the exploration of further explanatory variables of sustainable consumption or their intensity, but rather replicated previous findings according to the sustainability measures selected.

5.4 Implications for Future Research

Given the underlying decision-making process of sustainable consumption and intentions, it seems reasonable to investigate further variables, such as environmental concern and informedness or the impact of social norms, which have previously been identified as significant, explanatory factors of corresponding behavior. Moreover, to mitigate the effect of potential misrepresentations, it would be advisable to employ different methodologies to either replicate and support or disprove the findings of this study. One possibility would be to use choice experiments combined with revealed instead of stated valuations to seize the power of a binding characteristic, paired with an actual product as the research object.

Lastly, it should be considered that a sample size of 209 respondents only allows for tentative conclusions – indicating the need for a larger sample to strengthen the assumptions made. Furthermore, the sample did not adequately cover different nationalities, age groups, educational as well as income levels, limiting the conclusive power for the general population.

6 Conclusion

This study aimed at understanding the immediate impact of environmental sustainability information on consumers' stated WTP for hypothetical chocolate bars and connected the differing values to the individual's orientation toward sustainability as well as to demographic and socioeconomic factors. Albeit prone to several limitations, findings showed that consumers positively evaluate the existence of environmental sustainability information, expressed in a significantly increased WTP and underlining the price premium placed on green goods. Moreover, the results support prior research as measures, previously defined as sustainable consumption drivers, also proved to be significant when investigating the increase in WTP for the certified sustainable option. Furthermore, education and income were significant factors while gender did not exert any influence on the WTP increase. Lastly, the expressed orientation toward sustainability emphasizes the need of companies to rapidly adapt to this necessary trend.

7 References

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Appendix

Appendix A Questionnaire Design

1. Imagine you are buying a chocolate bar. What is the most you would generally be willing to pay for a conventional chocolate bar?
   As a reference, one conventional option (40g) costs €0.89 at your local supermarket.

Maximum Willingness to Pay [in €]	

2. Imagine again you are buying a chocolate bar – an environmentally sustainable one in this scenario. What is the most you would be willing to pay for this chocolate bar?
   As a reference, one conventional option (40g) costs €0.89 at your local supermarket.

Maximum Willingness to Pay [in €]	

3. Please consider the following certified information on the environmentally sustainable chocolate bar:
   - Vegan and organic
   - Plastic-free packaging
   - One tree is planted for every chocolate bar sold, compensating the corresponding production emissions and resulting in climate neutrality.

   What is the most you would be willing to pay for this chocolate bar?
   As a reference, one conventional option (40g) costs €0.89 at your local supermarket

Maximum Willingness to Pay [in €]	

Note: Maximum willingness to pay scale ranged from €0.00 to €10.00 in all three scenarios.

4. Please indicate your personal evaluation of the six statements you will be presented with below.

	Statement	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	I choose the environmentally friendly alternative if one of a similar price is available.							
2	I choose the environmentally friendly alternative regardless of price.							
3	I try to discover the environmental effects of products prior to purchase.							
4	It is worth it for the individual consumer to make efforts to preserve and improve the environment.							
5	Since each individual can have any effect upon environmental problems, what I do can make meaningful difference.							
6	By purchasing products made in an environmentally friendly way, each consumer's behavior can have a positive effect on the environment and society.							

5. Please indicate your personal evaluation of the 15 statements you will be presented with below.

	Statement	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
7	We are approaching the limit of the number of people the earth can support.							
8	Humans have the right to modify the natural environment to suit their needs.							
9	When humans interfere with nature, it often produces disastrous consequences.							
10	Human ingenuity will ensure that we do NOT make the earth unlivable.							
11	Humans are severely abusing the environment.							
12	The earth has plenty of natural resources if we just learn how to develop them.							
13	Plants and animals have as much right as humans to exist.							
15	The balance of nature is strong enough to cope with the impacts of modern industrial nations.							
15	Despite our special abilities humans are still subject to the laws of nature.							
16	The so-called “ecological crisis” facing humankind has been greatly exaggerated.							
17	The earth is like a spaceship with very limited room and resources.							
18	Humans were meant to rule over the rest of nature.							
19	The balance of nature is very delicate and easily upset.							
20	Humans will eventually learn enough about how nature works to be able to control it.							
21	If things continue on their present course, we will soon experience a major ecological catastrophe.							

6. Please indicate your personal evaluation of the three statements you will be presented with below.

	Statement	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
22	It is acceptable to pay 10 percent more for groceries that are produced, processed, and packaged in an environmentally friendly way.							
23	I would accept paying 10 percent more taxes to pay for an environmental cleanup program.							
24	I would be willing to spend an extra €10 a week in order to buy less environmentally harmful products.							

7. How old are you? _____

8. What is your gender?

Female
Male
Diverse

9. What is your highest level of education?

Less than high school
High school or equivalent
Bachelor's degree
Master's degree
Doctorate or equivalent

10. What is your average monthly net income? [in €]

$X \leq 500$
$500 < X \leq 1000$
$1000 < X \leq 1500$
$1500 < X \leq 2000$
$X > 2000$

11. What is your employment status?

Student
Employed
Self-employed
Unemployed
Other

12. What is your nationality? _____

Thank you for participating!

Your response has been recorded.

Source: Own Creation.

Appendix B Environmental Sustainability Measures

B.1 General Purchasing Behavior

Scale		Item
General Purchasing Behavior	1	I choose the environmentally friendly alternative if one of a similar price is available.
	2	I choose the environmentally friendly alternative regardless of price.
	3	I try to discover the environmental effects of products prior to purchase.

Source: Schlegelmilch et al., 1996.

B.2 Perceived Consumer Effectiveness

Scale		Item
Perceived Consumer Effectiveness	1	It is worth it for the individual consumer to make efforts to preserve and improve the environment.
	2	Since each individual can have any effect upon environmental problems, what I do can make meaningful difference.
	3	By purchasing products made in an environmentally friendly way, each consumer's behavior can have a positive effect on the environment and society.

Source: Kang et al., 2013.

B.3 New Ecological Paradigm

Scale		Item
New Ecological Paradigm	1	We are approaching the limit of the number of people the earth can support.
	2	Humans have the right to modify the natural environment to suit their needs.
	3	When humans interfere with nature, it often produces disastrous consequences.
	4	Human ingenuity will ensure that we do NOT make the earth unlivable.
	5	Humans are severely abusing the environment.
	6	The earth has plenty of natural resources if we just learn how to develop them.
	7	Plants and animals have as much right as humans to exist.
	8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
	9	Despite our special abilities humans are still subject to the laws of nature.
	10	The so-called "ecological crisis" facing humankind has been greatly exaggerated.
	11	The earth is like a spaceship with very limited room and resources.
	12	Humans were meant to rule over the rest of nature.
	13	The balance of nature is very delicate and easily upset.
	14	Humans will eventually learn enough about how nature works to be able to control it.
	15	If things continue on their present course, we will soon experience a major ecological catastrophe.

Note: Agreement with the eight odd-numbered items and disagreement with the seven even-numbered items indicate pro-NEP responses. Source: Dunlap et al., 2000.

B.4 Willingness to Pay More

Scale		Item
Willingness to Pay More	1	It is acceptable to pay 10 percent more for groceries that are produced, processed, and packaged in an environmentally friendly way.
	2	I would accept paying 10 percent more taxes to pay for an environmental cleanup program.
	3	I would be willing to spend an extra €10 a week in order to buy less environmentally harmful products.

Source: Laroche et al., 2001.

Appendix C Descriptive Statistics of Sample

#	Variable	Answer	Frequency	%
7	Age [Years] Mean = 25.53 years	$X \leq 24$ $24 < X \leq 30$ $X > 30$	102 93 14	48.80 44.50 6.70
8	Gender	Female Male	112 97	53.59 46.41
9	Highest Level of Education	High school degree or equivalent Bachelor's degree Master's degree Doctorate or equivalent	46 105 56 2	22.01 50.24 26.79 0.96
10	Average Monthly Net Income [€]	$X \leq 500$ $500 < X \leq 1000$ $1000 < X \leq 1500$ $1500 < X \leq 2000$ $X > 2000$	24 63 54 31 37	11.48 30.14 25.84 14.83 17.70
11	Employment Status	Student Employed Self-employed Unemployed Other	128 73 6 1 1	61.24 34.93 2.87 0.48 0.48
12	Nationality	Algeria Austria Belgium Canada Chile China Colombia Croatia Denmark France Germany Greece Italy Japan Luxembourg Netherlands Portugal Russian Federation Spain Sweden Switzerland United States of America	1 4 4 1 3 1 2 1 1 9 101 1 14 1 1 23 32 1 5 1 1 1	0.48 1.91 1.91 0.48 1.44 0.48 0.96 0.48 0.48 4.31 48.33 0.48 6.70 0.48 0.48 11.00 15.31 0.48 2.39 0.48 0.48 0.48

Source: Own Creation.

Appendix D Survey Results

Measure		Item	Answer	Frequency	%
GPB	1	I choose the environmentally friendly alternative if one of a similar price is available.	1 = Strongly Disagree	0	0.00
			2 = Disagree	1	0.48
			3 = Somewhat Disagree	2	0.96
			4 = Neutral	5	2.39
			5 = Somewhat Agree	31	14.8
			6 = Agree	68	32.54
			7 = Strongly Agree	102	48.80
GPB	2	I choose the environmentally friendly alternative regardless of price.	1 = Strongly Disagree	2	0.96
			2 = Disagree	34	16.27
			3 = Somewhat Disagree	54	25.84
			4 = Neutral	21	10.05
			5 = Somewhat Agree	54	25.84
			6 = Agree	34	16.27
			7 = Strongly Agree	10	4.78
GPB	3	I try to discover the environmental effects of products prior to purchase.	1 = Strongly Disagree	2	0.96
			2 = Disagree	12	5.74
			3 = Somewhat Disagree	24	11.48
			4 = Neutral	21	10.05
			5 = Somewhat Agree	75	35.89
			6 = Agree	47	22.49
			7 = Strongly Agree	28	13.40

Measure		Item	Answer	Frequency	%
PCE	1	It is worth it for the individual consumer to make efforts to preserve and improve the environment.	1 = Strongly Disagree	1	0.48
			2 = Disagree	2	0.96
			3 = Somewhat Disagree	2	0.96
			4 = Neutral	6	2.87
			5 = Somewhat Agree	42	20.10
			6 = Agree	81	38.76
			7 = Strongly Agree	75	35.89
PCE	2	Since each individual can have any effect upon environmental problems, what I do can make meaningful difference.	1 = Strongly Disagree	1	0.48
			2 = Disagree	4	1.91
			3 = Somewhat Disagree	17	8.13
			4 = Neutral	20	9.57
			5 = Somewhat Agree	61	29.19
			6 = Agree	71	33.97
			7 = Strongly Agree	35	16.75
PCE	3	By purchasing products made in an environmentally friendly way, each consumer's behavior can have a positive effect on the environment and society.	1 = Strongly Disagree	1	0.48
			2 = Disagree	2	0.96
			3 = Somewhat Disagree	4	1.91
			4 = Neutral	25	11.96
			5 = Somewhat Agree	61	29.19
			6 = Agree	69	33.01
			7 = Strongly Agree	47	22.49

Measure		Item	Answer	Frequency	%
NEP	1	We are approaching the limit of the number of people the earth can support.	1 = Strongly Disagree	2	0.96
			2 = Disagree	2	0.96
			3 = Somewhat Disagree	9	4.31
			4 = Neutral	10	4.78
			5 = Somewhat Agree	51	24.40
			6 = Agree	92	44.02
			7 = Strongly Agree	43	20.57
NEP *r*	2	Humans have the right to modify the natural environment to suit their needs.	1 = Strongly Agree	22	10.53
			2 = Agree	69	33.01
			3 = Somewhat Agree	69	33.01
			4 = Neutral	9	4.31
			5 = Somewhat Disagree	23	11.00
			6 = Disagree	13	6.22
			7 = Strongly Disagree	4	1.91
NEP	3	When humans interfere with nature, it often produces disastrous consequences.	1 = Strongly Disagree	1	0.48
			2 = Disagree	0	0.00
			3 = Somewhat Disagree	7	3.35
			4 = Neutral	8	3.83
			5 = Somewhat Agree	63	30.14
			6 = Agree	89	42.58
			7 = Strongly Agree	41	19.62
NEP *r*	4	Human ingenuity will ensure that we do NOT make the earth unlivable.	1 = Strongly Agree	15	7.18
			2 = Agree	58	27.75
			3 = Somewhat Agree	72	34.45
			4 = Neutral	20	9.57
			5 = Somewhat Disagree	29	13.88
			6 = Disagree	10	4.78
			7 = Strongly Disagree	5	2.39
NEP	5	Humans are severely abusing the environment.	1 = Strongly Disagree	1	0.48
			2 = Disagree	1	0.48
			3 = Somewhat Disagree	0	0.00
			4 = Neutral	6	2.87
			5 = Somewhat Agree	44	21.05
			6 = Agree	100	47.85
			7 = Strongly Agree	57	27.27
NEP *r*	6	The earth has plenty of natural resources if we just learn how to develop them.	1 = Strongly Agree	15	7.18
			2 = Agree	47	22.49
			3 = Somewhat Agree	57	27.27
			4 = Neutral	24	11.48
			5 = Somewhat Disagree	33	15.79
			6 = Disagree	20	9.57
			7 = Strongly Disagree	13	6.22
NEP	7	Plants and animals have as much right as humans to exist.	1 = Strongly Disagree	0	0.00
			2 = Disagree	1	0.48
			3 = Somewhat Disagree	8	3.83
			4 = Neutral	26	12.44
			5 = Somewhat Agree	45	21.53
			6 = Agree	65	31.10
			7 = Strongly Agree	64	30.62

NEP *r*	8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	1 = Strongly Agree	77	36.84
			2 = Agree	83	39.71
			3 = Somewhat Agree	32	15.31
			4 = Neutral	8	3.83
			5 = Somewhat Disagree	7	3.35
			6 = Disagree	1	0.48
			7 = Strongly Disagree	1	0.48
NEP	9	Despite our special abilities humans are still subject to the laws of nature.	1 = Strongly Disagree	0	0.00
			2 = Disagree	2	0.96
			3 = Somewhat Disagree	1	0.48
			4 = Neutral	11	5.26
			5 = Somewhat Agree	19	9.09
			6 = Agree	62	29.67
			7 = Strongly Agree	114	54.55
NEP *r*	10	The so-called "ecological crisis" facing humankind has been greatly exaggerated.	1 = Strongly Agree	91	43.54
			2 = Agree	71	33.97
			3 = Somewhat Agree	25	11.96
			4 = Neutral	9	4.31
			5 = Somewhat Disagree	10	4.78
			6 = Disagree	2	0.96
			7 = Strongly Disagree	1	0.48
NEP	11	The earth is like a spaceship with very limited room and resources.	1 = Strongly Disagree	4	1.91
			2 = Disagree	3	1.44
			3 = Somewhat Disagree	7	3.35
			4 = Neutral	18	8.61
			5 = Somewhat Agree	90	43.06
			6 = Agree	61	29.19
			7 = Strongly Agree	26	12.44
NEP *r*	12	Humans were meant to rule over the rest of nature.	1 = Strongly Agree	42	20.10
			2 = Agree	62	29.67
			3 = Somewhat Agree	59	28.23
			4 = Neutral	25	11.96
			5 = Somewhat Disagree	18	8.61
			6 = Disagree	2	0.96
			7 = Strongly Disagree	1	0.48
NEP	13	The balance of nature is very delicate and easily upset.	1 = Strongly Disagree	1	0.48
			2 = Disagree	4	1.91
			3 = Somewhat Disagree	4	1.91
			4 = Neutral	8	3.83
			5 = Somewhat Agree	55	26.32
			6 = Agree	95	45.45
			7 = Strongly Agree	42	20.10
NEP *r*	14	Humans will eventually learn enough about how nature works to be able to control it.	1 = Strongly Agree	32	15.31
			2 = Agree	73	34.93
			3 = Somewhat Agree	45	21.53
			4 = Neutral	24	11.48
			5 = Somewhat Disagree	21	10.05
			6 = Disagree	11	5.26
			7 = Strongly Disagree	3	1.44
NEP	15	If things continue on their present course, we will soon experience a major ecological catastrophe.	1 = Strongly Disagree	1	0.48
			2 = Disagree	0	0.00
			3 = Somewhat Disagree	2	0.96
			4 = Neutral	3	1.44
			5 = Somewhat Agree	17	8.13
			6 = Agree	68	32.54
			7 = Strongly Agree	118	56.46

Note: *r* indicates reverse coding.

Measure		Item	Answer	Frequency	%
WTPM	1	It is acceptable to pay 10 percent more for groceries that are produced, processed, and packaged in an environmentally friendly way.	1 = Strongly Disagree	0	0.00
			2 = Disagree	0	0.00
			3 = Somewhat Disagree	2	0.96
			4 = Neutral	12	5.74
			5 = Somewhat Agree	49	23.44
			6 = Agree	55	26.32
			7 = Strongly Agree	91	43.54
WTPM	2	I would accept paying 10 percent more taxes to pay for an environmental cleanup program.	1 = Strongly Disagree	5	2.39
			2 = Disagree	24	11.48
			3 = Somewhat Disagree	25	11.96
			4 = Neutral	24	11.48
			5 = Somewhat Agree	51	24.40
			6 = Agree	44	21.05
			7 = Strongly Agree	36	17.22
WTPM	3	I would be willing to spend an extra €10 a week in order to buy less environmentally harmful products.	1 = Strongly Disagree	2	0.96
			2 = Disagree	2	0.96
			3 = Somewhat Disagree	20	9.57
			4 = Neutral	22	10.53
			5 = Somewhat Agree	38	18.18
			6 = Agree	55	26.32
			7 = Strongly Agree	70	33.49

Source: Own Creation.

Appendix E Statistical Test Results

E.1 Shapiro-Wilk Test Results for Stated WTP Valuations

Scenario	Statistic	df	p
WTP 1	.756	209	<.001***
WTP 2	.831	209	<.001***
WTP 3	.882	209	<.001***

Significance at: ***p < .01; **p < .05; *p < .10
Source: Own Computation.

E.2 Wilcoxon Signed-Rank Test Results

E.2.1 Descriptive Statistics for Stated WTP Valuations

Scenario	Mean [€]	SD [€]	Min. [€]	Max. [€]	n
WTP 1	1.40	.63	.89	4.00	209
WTP 2	1.87	.85	.99	5.00	209
WTP 3	2.19	.93	.99	5.04	209

Source: Own Computation.

E.2.2 Wilcoxon Signed-Rank Test Results: WTP 1 – WTP 2

Wilcoxon Signed-Rank Test WTP 1 – WTP 2						
		n	Mean Rank	Sum of Ranks	Z	p
WTP 2 - WTP 1	Negative Ranks	0[a]	.00	.00	-12.048	<.001***
	Positive Ranks	193[b]	97.00	18721.00		
	Ties	16[c]	-	-		
	Total	209	-	-		

Significance at: ***p < .01; **p < .05; *p < .10
a. WTP 2 < WTP 1
b. WTP 2 > WTP 1
c. WTP 2 = WTP 1
Source: Own Computation.

E.2.3 Wilcoxon Signed-Rank Test Results: WTP 1 – WTP 3

Wilcoxon Signed-Rank Test WTP 1 – WTP 3						
		n	**Mean Rank**	**Sum of Ranks**	**Z**	**p**
WTP 3 - WTP 1	**Negative Ranks**	0[d]	.00	.00	-12.233	<.001***
	Positive Ranks	199[e]	100.00	19900.00		
	Ties	10[f]	-	-		
	Total	209	-	-		

Significance at: ***p < .01; **p < .05; *p < .10
d. WTP 3 < WTP 1
e. WTP 3 > WTP 1
f. WTP 3 = WTP 1
Source: Own Computation.

E.2.4 Wilcoxon Signed-Rank Test Results: WTP 2 – WTP 3

Wilcoxon Signed-Rank Test WTP 2 – WTP 3						
		n	**Mean Rank**	**Sum of Ranks**	**Z**	**p**
WTP 3 - WTP 2	**Negative Ranks**	1[g]	28.00	28.00	-11.790	<.001***
	Positive Ranks	185[h]	93.85	17363.00		
	Ties	23[i]	-	-		
	Total	209	-	-		

Significance at: ***p < .01; **p < .05; *p < .10
g. WTP 3 < WTP 2
h. WTP 3 > WTP 2
i. WTP 3 = WTP 2
Source: Own Computation.

E.3 Statistical Test Results Involving Sustainability Measures

E.3.1 Descriptive Statistics of Sustainability Measure Scores

n = 209		GPB Score	PCE Score	NEP Score	WTPM Score
Mean		15.31	16.92	83.41	16.39
Median		16.00	17.00	85.00	17.00
Minimum		7.00	3.00	31.00	6.00
Maximum		21.00	21.00	105.00	21.00
Percentiles	25	14.00	15.00	77.00	14.00
	50	16.00	17.00	85.00	17.00
	75	18.00	19.00	91.00	20.00

Source: Own Computation.

E.3.2 Mann-Whitney Test Results: Difference WTP and Sustainability Measures

	Indicator	Median Score	n	n *Low*	n *High*	U	Z	p	r
WTP 3 - WTP 1	GPB	16.00	185	101	84	2166.00	-5.727	<.001***	.42
	PCE	17.00	188	84	104	3083.00	-3.465	<.001***	.25
	NEP	85.00	202	98	104	3024.50	-4.990	<.001***	.35
	WTPM	17.00	192	97	95	2283.50	-6.039	<.001***	.44

Significance at: ***p < .01; **p < .05; *p < .10
Source: Own Computation.

E.4 Statistical Test Results Involving Demographic and Socioeconomic Data

E.4.1 Mann-Whitney Test Results: Difference WTP and Gender

	Indicator	n	Female	Male	U	Z	p
WTP 3 - WTP 1	Gender	209	112	97	5103.00	-.755	.450

Significance at: ***p < .01; **p < .05; *p < .10
Source: Own Computation.

E.4.2 Kruskal-Wallis Test Results: Difference WTP and Level of Education

Total N	209
Test Statistic	19.402
Degrees of Freedom	3
Asymptotic Significance (2-sided test)	<.001***

Significance at: ***p < .01; **p < .05; *p < .10
Source: Own Computation.

E.4.3 Kruskal-Wallis Test Results: Pairwise Comparisons of Level of Education

Sample 1 – Sample 2	Test Statistic	Standard Error	Standard Test Statistic	Significance	Adjusted Significance[a]
2–3	-16.956	10.690	-1.586	.113	.676
2–4	-44.778	12.031	-3.722	<.001	.001***
2–5	-114.109	43.672	-2.613	.009	.054*
3–4	-27.822	10.005	-2.781	.005	.033**
3–5	-97.152	43.158	-2.251	.024	.146
4–5	-69.330	43.509	-1.593	.111	.666

Significance at: ***p < .01; **p < .05; *p < .10
a. Significance values adjusted by the Bonferroni correction for multiple tests.
1. Less than high school
2. High school degree or equivalent
3. Bachelor's degree
4. Master's degree
5. Doctorate or equivalent

Source: Own Computation.

E.4.4 Kruskal-Wallis Test Results: Difference WTP and Level of Income

Total N	209
Test Statistic	13.072
Degrees of Freedom	4
Asymptotic Significance (2-sided test)	.011**

Significance at: ***p < .01; **p < .05; *p < .10
Source: Own Computation.

E.4.5 Kruskal-Wallis Test Results: Pairwise Comparisons of Level of Income

Sample 1 – Sample 2	Test Statistic	Standard Error	Standard Test Statistic	Significance	Adjusted Significance[a]
2–1	13.362	14.503	.921	.357	1.000
2–3	-16.980	11.213	-1.514	.130	1.000
2–4	-22.562	13.265	-1.701	.089	.890
2–5	-44.661	12.523	-3.566	<.001	.004***
1–3	-3.618	14.833	-.244	.807	1.000
1–4	-9.200	16.439	-.560	.576	1.000
1–5	-31.299	15.847	-1.975	.048	.483
3–4	-5.582	13.624	-.410	.682	1.000
3–5	-27.681	12.903	-2.145	.032	.319
4–5	-22.099	14.721	-1.501	.133	1.000

Significance at: ***p < .01; **p < .05; *p < .10
a. Significance values adjusted by the Bonferroni correction for multiple tests.
1. $X \leq 500$
2. $500 < X \leq 1000$
3. $1000 < X \leq 1500$
4. $1500 < X \leq 2000$
5. $X > 2000$

Source: Own Computation.