



CENTER FOR  
TAX AND  
ACCOUNTING  
RESEARCH



# TAXATION, ACCOUNTING, AND FINANCE TAF WORKING PAPER

No. 87 / September 2023

**Customers' purchase decisions and  
service-level sustainability information**

Kosi, Urska / von Hagen, Franziska

# Customers' purchase decisions and service-level sustainability information

**Urska Kosi\***

Faculty of Business Administration and Economics  
Paderborn University  
Warburger Str. 100  
33098 Paderborn  
Germany

**Franziska von Hagen**

Faculty of Business Administration and Economics  
Paderborn University  
Warburger Str. 100  
33098 Paderborn  
Germany

## Abstract

This paper investigates whether customers' purchase decisions are associated with service-level greenhouse gas (GHG) emissions information and with customers' general sustainability awareness. We survey customers in rail transport and capture their purchase decisions via their willingness to pay a price premium (WTPP) for a service. We use three scenarios which vary according to the service-level GHG emissions information provided at the time of purchase. We analyze 115 responses using rank correlations and difference-in-means tests. We find that 25% to 37% of respondents show a WTPP and that the average price premium (PP) is 2.57% to 5.05% of the price of the service. The results show that service-level GHG emissions information is not associated with customers' WTPP or PP. But consistent with previous research, customers' general sustainability awareness is positively associated with the WTPP and PP. Our findings imply that sustainable purchase decisions are more likely encouraged via raising awareness about sustainability issues and creating knowledge about environmental concerns than via provision of sustainability information on a product level. Policy makers should thus trade-off costly information provision with (lack of) benefits from encouraging customers' sustainable purchase decisions.

**Keywords:** Sustainability, Purchase decision, Greenhouse gas emissions, Price premium, Willingness to pay

---

\*Corresponding author: [urska.kosi@uni-paderborn.de](mailto:urska.kosi@uni-paderborn.de) ORCID 0009-0009-2545-5929

Acknowledgements: We thank Maryna Gulenko and colloquium participants at the Paderborn University for useful comments and suggestions. We are grateful for invaluable research assistant work by Gabriel Beres, Eva-Maria Hebbelmann and Julia Skiba.

Urska Kosi acknowledges financial support from the German Research Foundation (DFG): project ID 40341268 – TRR 266. The authors have no relevant financial or non-financial interests to disclose. All errors are our own.

## **1 Introduction**

Adoption of the Sustainable Development Goals (SDGs) by 193 countries around the world (UN, 2015a, 2015b) and increased environmental concerns in societies have pushed firms to behave in a more socially and environmentally responsible way. Consequently, the need for information about corporate sustainability activities and performance among investors has steadily risen (Amel-Zadeh & Serafeim, 2018) and has also become a focus of customer interest (Carrigan & Attalla, 2001; Kuokkanen & Sun, 2020). While survey studies show that information about firm-level sustainability performance is positively associated with customers' purchase decisions (Cohn & Wolfe, 2011; Trudel & Cotte, 2009), we investigate how product- or service-level sustainability information is associated with purchase decisions. In particular, we study information about greenhouse gas (hereafter GHG) emissions of a purchased service in passenger rail transport industry. We acknowledge that sustainability issues are one of the greatest global challenges and decide to focus on the environmental aspect. We particularly choose environmental concerns related to GHG emissions because their rising concentration gains a lot of attention in research and media (O'Connor et al., 2002; ZDF, 2023a). Moreover, GHG emissions contribute to global warming which leads to climate change. Because climate change creates an increasing number of disasters like extreme weather events and food shortages (BPB, 2021), we investigate how to encourage customers' sustainable purchase decisions as a means of combating climate change.

While firms' disclosure of sustainability performance intends to inform various stakeholders, we focus on customers because of documented positive association between sustainability performance and their purchase decisions (Cohn & Wolfe, 2011; Cone, 2004; Trudel & Cotte, 2009). Moreover, customer behavior forms the basis for revenue generation. To capture how customers perceive the value of sustainable products or services, existing studies (e.g., Laroche et al., 2001; Ottenbacher et al., 2019) investigate customers' willingness to pay a price premium

(hereafter WTPP). The price premium (hereafter PP) is the excess price which lies above the economic value of a product or service (Rao & Bergen, 1992). In the context of GHG emissions reduction, passenger rail transport is a suitable industry to investigate because train travel creates considerably fewer GHG emissions than car travel (Umweltbundesamt, 2023). Therefore, we investigate the impact of service-level GHG emissions information on customers' purchase decisions in the rail transport. We analyze whether a firm's provision of different amounts of granular sustainability (i.e., GHG emissions) information about a service at the time of purchase influences customers' willingness to pay a price premium for the service.

We employ data from a survey conducted in January 2023 among undergraduate university students. The final sample consists of 115 responses. First, we more generally ask participants about the following: 1) importance of sustainability issues in their everyday lives, 2) the role of sustainability in their purchase decisions, and 3) the importance of sustainability information. Next, we randomly assign participants into one of three scenarios that give them different amounts of GHG emissions information. Participants indicate their WTPP and the amount of the PP. We hypothesize that more information about GHG emissions of the purchased service is positively associated with the WTPP and the PP. The findings indicate that customers, on average, are willing to pay a price premium for sustainable services. On the one hand, the results show that granular GHG emissions information about the service are not significantly associated with the WTPP and the PP. There is also no association with demographic characteristics. On the other hand, general attitudes towards sustainability and behaviors of customers are positively associated with the WTPP and the PP. The latter is in line with findings in prior studies (e.g., Okada & Mais, 2010; Ottenbacher et al., 2019). In sum, our findings imply that sustainable purchase decisions are likely encouraged via raising general awareness about sustainability issues and creating knowledge about environmental concerns but not by service-level sustainability information provided by firms to their customers.

Our study contributes to existing literature in the following ways. First, we add to the body of prior literature about WTPP in service industries (e.g., Ottenbacher et al., 2019). In particular, we investigate purchase decisions for a sustainable service in the under-researched field of passenger rail transport. While prior research focused on offsetting GHG emissions (e.g., Hinnen et al., 2017), we study a service characterized by fewer GHG emissions and apply WTPP as a mechanism to reward the firm for its sustainable activities. Similarly, we contribute to existing studies on WTPP (e.g., Biswas, 2016) by adding the amount of the PP which obtained relatively limited attention so far. Second, our finding that general attitudes towards sustainability and behaviors of customers have more influence on sustainable purchase decisions than service-level information provided by the firm contributes to the debate how to encourage sustainable purchase decisions as a means of combating climate change. Although customers wish to clearly see a product's carbon footprint (Yara, 2023), it is relatively costly for firms to provide granular sustainability information on a product or service level. Therefore, policy makers should consider the trade-off between costs of granular reporting on product level and (lack of) benefits from encouraging customers' purchase of sustainable products labelled with detailed information. Finally, we document drivers of the WTPP in a specific demographic group. Younger population (i.e., undergraduate university students) is a generation that will be very strongly affected by the impact of extensive GHG emissions. Other studies (e.g., Drozdenko et al., 2011) focus on older or more diverse population.

## **2 Institutional background and hypotheses development**

### **2.1 Customers as important stakeholders**

Prior literature documents customers' interest in firms' sustainability information and performance (Carrigan & Attalla, 2001; Kuokkanen & Sun, 2020). Moreover, survey studies suggest a positive association between sustainability performance and customers' purchase

decisions (Cohn & Wolfe, 2011; Cone, 2004; Trudel & Cotte, 2009). Based on firms' sustainability performance, customers decide whether to reward or put pressure on firms by buying or boycotting their products (De Pelsmacker et al., 2005; Liesen et al., 2015). Customers' purchase decisions are crucial for firms because customers are their very important stakeholders and form the basis for revenue generation. In order to create loyal and trusted relationships with customers, firms must not only satisfy customers' product or service demand but also create a holistic view by including customers' psychological needs like self-definition and social identity (Bhattacharya & Sen, 2004; KPMG, 2021).

Disclosure of sustainable activities by firms has become increasingly important throughout the past decades for firms themselves as well as their stakeholders, and has been intensively studied by academics (e.g., Amel-Zadeh & Serafeim, 2018; Dobbs & van Staden, 2016; Hoffmann et al., 2018; Mion & Aduai, 2020). While many firms disclose sustainability information and performance on a voluntary basis, other firms face regulatory mandates and have to disclose sustainability reports mandatorily. For example, the Non-Financial Reporting Directive (Directive 2014/95/EU) lays out rules for disclosing sustainability information for firms in the European Union with more than 500 employees, including listed firms, banks, and insurance firms. Firms under the scope of the Directive are obliged to report on policies, outcomes, and risks of "environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters" (EU, 2014, p. 4). Sustainability disclosures, either on voluntary or mandatory basis, reduces information asymmetries between firms and their stakeholders, including customers. In addition, firms diminish social and governmental pressure, obtain their legitimacy, enhance their reputation, and possibly even establish a competitive advantage (Gallego-Álvarez & Quina-Custodio, 2016; Schröder, 2021).

Recent survey report published by Yara (2023), documents that customers in Europe are highly motivated to purchase sustainable food and, in this way, reduce their climate impact. In particular, more than half of the respondents consider climate impact as important when purchasing food products, and are willing to pay a price premium for climate-friendly products. However, more than 75% of respondents do not find it easy to identify climate-friendly products and want to see a product's carbon footprint on its label. These findings suggest that customers are less likely to use firms' sustainability reports, which are prepared on firm level and present highly aggregated sustainability information, in their purchase decisions. We therefore investigate to what extent is product- or service-level information used in customers' purchase decisions.

## **2.2 Greenhouse gas emissions and passenger rail transport**

Our study focuses on a specific aspect of sustainability, namely climate issues. We therefore investigate a particular type of climate-related information about a product or service, that is information about GHG emissions. We study the association between different amounts of this information and customers' purchase decisions in passenger rail transport.

While GHGs are essential for life, their increasing concentration in the atmosphere causes global warming. To understand their impact, it is important to differentiate between two effects. First, the natural GHG effect is essential for life as it keeps the Earth's surface warm enough for living. Second, the enhanced GHG effect is created by humans. Due to the latter, global GHG concentration has been increasing since pre-industrial times, causing global warming and resulting in climate change (BPB, 2021). Main GHG emissions include carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, and fluorinated gases. CO<sub>2</sub> accounts for about three quarters of global GHG emissions. CO<sub>2</sub> and nitrous oxide are released during the combustion of fossil fuel, methane is mainly set free in agriculture, and fluorinated gases by various household and

industrial processes (BPB, 2021). The three largest sectors contributing to global GHG emissions are: 1) energy consumption in industry (24%, e.g., manufacturing of consumer goods), 2) energy use in buildings (18%), and 3) transport (16%) with road transport accounting for the majority of the emissions, mostly due to passenger travel (Our World in Data, 2020b).

In 2020, 1.85 billion people used rail transport in Germany, which is 6.3% of the total passenger transport. These figures are expected to increase in the future and it is estimated that 9.8% of passenger transport in Germany will take place by rail in 2024 (Statista, 2022a; Statistisches Bundesamt, 2022). Competitive advantage of rail travel against other transport options come mainly from rising fossil fuel prices and high congestion caused by GHG emissions (EC, 2016). Compared to private transport, the GHG emissions of rail transport are significantly lower. While private road transport accounts for almost half of the global transport emissions, rail transport (including freight) emits less than 1% of global transport emissions (Our World in Data, 2020a). The difference in pollution impact depends on the distance and the rail's energy source but data shows that the GHG emissions per km are up to three times as high using a car instead of going by train (Umweltbundesamt, 2023).

In our study, survey participants are in a situation where they purchase a rail transport ticket from the Deutsche Bahn AG (hereafter DB). The firm is the largest service provider of passenger rail transport in Germany. Its market share is 67% and 98% in regional and long-distance transport, respectively (Statista, 2022b, 2022c). It is a state-owned firm with roughly 324,000 employees. With the *Green Transformation* project, the DB is taking responsibility for sustainability issues and environmental concerns, and implementing measures to achieve zero GHG emissions by 2040. Their fleet runs mostly on renewable energy sources and very few fossil fuels. This enables more sustainable services, which release less pollutants compared to an average rail transport provider (DB, 2022).



### **2.3 Related literature and hypotheses**

“A PP can be thought of as the excess price paid, over and above the “fair” price that is justified by the “true” value of the product. This excess price has typically been viewed as the amount paid over and above all economic costs of manufacture” (Rao & Bergen, 1992, p. 412). Previous studies have investigated premiums for sustainable products and services in several industries and present mixed findings. O'Connor et al. (2002) and Ottenbacher et al. (2019) find that up to 50% of customers are WTPP for sustainable products and services, while Hinnen et al. (2017) find only 15% of customers that are WTPP for sustainable services. Other studies show that the PP for sustainable products and services amounts to 10% of the original price (Aguilar & Vlosky, 2007; Drozdenko et al., 2011; Laroche et al., 2001).

On the one hand, firms can encourage the WTPP through appropriate advertising (Chekima et al., 2016) and on the other hand, general attitudes towards sustainability and behaviors of customers also influence the WTPP (Okada & Mais, 2010; Ottenbacher et al., 2019). In particular, if sustainability is important to an individual and they behave accordingly, a positive effect on WTPP should be observed. Hinnen et al. (2017) state that an individual who generally behaves in a sustainable manner transfers this behavior into her purchase decisions. Similarly, Laroche et al. (2001) find that the WTPP is higher when individuals consider sustainability in their purchase decisions. In addition, findings show that attitudes towards environmental concerns such as climate change determine the amount of the PP (Biswas, 2016; Lim & Yoo, 2014; Okada & Mais, 2010). Studies about importance of participants' demographic characteristics show mixed results. For example, Ottenbacher et al. (2019) show that females place more importance on sustainability than males. Chekima et al. (2016) suggest that gender can impact sustainable purchase behavior but Hinnen et al. (2017) find no significant impact of

gender nor age. While Drozdenko et al. (2011) find that customers' income relates to WTPP, Chekima et al. (2016) show that income is not associated with WTPP.

When firms disclose sustainability information, customers can evaluate their sustainability performance and information about sustainable attributes of their product or service. Customers decide whether or not to purchase the product or service. Since firms depend on the purchasing power of their customers they are under pressure to meet and adapt to customers' needs. For example, Abrantes Ferreira et al. (2010) show that sustainable attributes can also add marginal value to products and services. Our study therefore investigates how customers react to different amounts of granular sustainability information, in particular, what is the impact of service-level sustainability information on their purchase decisions. We measure customers' purchase decisions via the WTPP for a sustainable service. While there are several attributes that can be considered as sustainable, we focus on environmental information. Specifically, the increasing threat of GHG emissions leading to global warming and climate change, makes sustainable purchase decisions an appropriate means of combating climate change. In line with findings by Yara (2023), we expect customers to react positively to GHG emissions information about a purchased service at the time of purchase and to transpose this reaction into the WTPP. We form the following hypotheses in the alternative form:

H1: The amount of GHG emissions information on service level is positively associated with customers' WTPP.

H2: The amount of GHG emissions information on service level is positively associated with the amount of PP.

### **3 Data and methodology**

Our analysis is performed on data derived from a survey. The survey was conducted in the undergraduate lecture "Marketing Strategy" on January 16, 2023. The students were asked to

join the survey on *LimeSurvey* platform and used their own electronic devices to access the platform. The time to answer the questionnaire was three to five minutes. We received a total of 140 responses but had to exclude 25 responses because they were incomplete. The survey also included an attention check, whereby we asked one question twice. Any responses to this question that would be more than two Likert points apart, would have been excluded from the sample but this was not the case. The final sample thus consists of 115 responses. Demographic composition of the sample is provided in Table 1. 70% of the participants are 20 years old or younger and half of the respondents are female. Most respondents (39%) are unemployed, followed by respondents with income up to €520<sup>1</sup> (35%).

[Insert Table 1 about here]

The survey questions are grouped into five blocks. Table A1 in the appendix describes the questionnaire's development and Table A2 shows the whole questionnaire. We use the survey to test the hypothesized association between service-level GHG emissions information and the WTPP for a sustainable service. In the introduction, we provide participants with a definition of sustainability and GHG emissions. Next, we have three blocks with more general questions about the attitudes towards sustainability and behaviors of customers. Responses are given on a five-point Likert scale, with an option for no specification. Block 1 asks about importance of sustainability issues in participants' everyday lives. The average response of a participant to all questions in this block represents a variable that we call *sustainability importance*. Block 2 asks six questions about the role of sustainability and GHG emissions in participants' purchase decisions. The average of six responses represents a variable called *sustainable purchases*. The third block asks five questions about the importance of sustainability information and the

---

<sup>1</sup>€520 is a reasonable threshold because this is the typical pay limit for the so-called mini job in Germany. Income includes only income from work, while scholarships and student loans are not considered.

average of five responses represents a variable called *sustainability information*. These three created variables allow us to test previously documented associations between customers' attitudes and behaviors towards sustainability and their WTPP (Laroche et al., 2001; Okada & Mais, 2010; Ottenbacher et al., 2019).

The fourth block of questions contains three scenarios, whereby participants are randomly assigned to one of them. In each scenario, a participant gets a monetary award and uses it to purchase a train ticket online, whereby she is asked two questions. The first question investigates what is the WTPP and the second question asks about the amount of PP. The choice is between no premium, €1.00, €2.50, €5.00, and €7.50, which is paid on top of the price for the train ticket (€50.00). Each scenario gives different amounts of service-level GHG emissions (i.e., for the train ride). Scenario 1 contains no information about GHG emissions. Scenario 2 gives participants information only about GHG emissions of the purchased service. In scenario 3, participants get information about GHG emissions resulting from the train ride compared to GHG emissions for the same route traveled by car. Random assignment of participants to scenarios results in the following distribution: 33 to scenario 1, 44 to scenario 2, and 38 to scenario 3. In the fifth block, the respondents answer three questions about their demographics.

Responses to questions are given on a five-point scale as presented in Table A2 in the appendix. We conduct statistical tests using eight variables. We create variable *sustainability importance* from block 1. We use blocks 2 and 3 to create variables *sustainable purchases* and *sustainability information*, respectively. For each of these variables, we further split participants into sustainable customer segment and regular customer segment. Following Hinnen et al. (2017), participants with aggregate score higher than the middle of the range are in the sustainable segment and others are in the regular segment (see Table A3 for details). We get variable *WTPP* from question 17 and variable *PP* from question 18. We use variables *age*, *gender* and

*employment* to capture demographic characteristics. For *age*, the participants are split into young segment (20 or younger) and old segment (older than 21). Regarding *gender*, responses diverse and no specification are excluded as they only accounted for 4% of the respondents. For *employment*, no specification responses are eliminated, and the segments employed and unemployed are created.

## **4 Results**

### **4.1 Descriptive statistics**

We start with descriptive statistics of responses to questions in blocks 1 to 3 which indicate general sustainability awareness of customers. Table 2 Panel A relates to block 1 and shows respondents' perceived sustainability importance in everyday life. The average score for all five questions is 3.55 (mode is 4, very likely). The average score for each question is 3 or higher and in four out of five questions the mode is 4 or 5. We interpret these findings as respondents, on average, having very high awareness of general sustainability issues in everyday life. Panel B relates to respondents' consideration of sustainability in purchase decisions. The average score to all questions in block 2 is 3.02 (mode is 4). The highest average score per question is 3.20. These findings indicate that respondents, on average, consider sustainability in their purchase decisions. However, questions 7 and 8 have averages below 3. This implies that the sustainability of a firm and the GHG emissions of products and services are considered in purchase decisions the least. Panel C summarizes the responses for block 3 and relates to importance of sustainability information. The average answer is 2.92 (mode is 4). Questions 15 and 16 have averages below 3. This shows that respondents, on average, do not spend time searching for sustainability information. Therefore, it is a relevant empirical question if customers would consider sustainability information in purchase decisions if it is provided directly for the purchased product or service at the time of purchase.

[Insert Table 2 about here]

Responses from block 4 contain our two main variables of interest. Table 3 presents customers' *WTPP*. In the total sample, we find 30% of respondents indicating that they are *WTPP* (very likely and rather likely) and the average score is 2.81. In scenario 1 (no information about GHG emissions), also 30% of the respondents indicate that they are *WTPP*. The average score and mode are 3 (neutral *WTPP*). In scenario 2 (information about GHG emissions of the train ride), 25% of respondents show a *WTPP*. The average score is 2.5 and modes are 2 and 1. In scenario 3 (information about GHG emissions of the train ride compared to the car travel), 37% of respondents indicate a *WTPP*, with the average score of 3. This presents the highest relative frequency of customers with a *WTPP* across all three scenarios.

Our findings that 25% to 37% of the participants are *WTPP* are higher than the results of Hinnen et al. (2017). They study the *WTPP* for additional products and services in the aviation industry and find an average *WTPP* of 15%. The reason could be that customers in rail travel likely give more consideration to environmental concerns than those in air travel. Furthermore, air travel is more expensive than rail travel, so price sensitive customers could have a lower *WTPP*. At the same time, our results are lower than findings of O'Connor et al. (2002), who examine the *WTPP* for the reduction of carbon emissions. They find 32% to 50% of participants that are *WTPP*. However, they do not study the transportation industry but focus on clean energy use in households or manufacturing facilities.

[Insert Table 3 about here]

Fig. 1 presents the responses graphically. Scenario 1 responses peak in the middle and decrease rather symmetrically to the left (*WTPP*) and right (no *WTPP*). Neutral was chosen by far more

respondents than in scenario 2 (difference of 19 percentage points). Scenario 2 increases to the right, while scenario 3 is the most evenly distributed. In scenario 2, more than half of the respondents are not WTPP, which deviates from the other scenarios and is not in line with our H1. Compared to scenario 3, the number of respondents that are rather unlikely WTPP is higher (difference of 9 percentage points). Similarly, compared to scenario 1, the number of respondents that are very unlikely WTPP is higher (difference of 18 percentage points). This descriptive results indicate that information about GHG emissions without a comparison to less sustainable services is less likely to influence customers' WTPP.

[Insert Fig. 1 about here]

Table 4 presents the *PP* that respondents would pay. In scenario 1, 70% of respondents decide to pay a *PP* for their train ticket, with the mode €2.50 and the average €2.15 (4.30% of the price). In scenario 2, the majority of respondents would pay a *PP* (55%) but the mode is €0.00, and the average is €1.28 (2.57%). As with *WTPP*, the values in scenario 2 are lower than in scenario 1. 74% of respondents would pay a *PP* in scenario 3. The mode is €2.50, and the average *PP* is €2.53 (5.05%). A *PP* range between €1.28 (€0.30 per 100 km) and €2.53 (€0.60 per 100 km) is higher than in Lim & Yoo (2014) (about €0.24 per 100 km), who investigate rail transport in South Korea. One possible explanation are regional differences, for example in average income and spending. Moreover, the original price of the train tickets in Lim & Yoo (2014) is unknown. If the price is lower, this could explain the difference, as premiums are set as a percentage of the price. While some respondents choose a *PP* of 10% (a few even 15%), the average *PP* in our study (4.30% in scenario 1, 2.57% in 2, and 5.05% in 3) is lower than the 10% suggested by prior research (Aguilar & Vlosky, 2007; Drozdenko et al., 2011; Laroche et al., 2001). However, the prior research investigates *PP* for products as opposed to services.

Additionally, traveling by train instead of by car already creates a benefit for the environment, which might be a factor that lowers the PP.

[Insert Table 4 about here]

In Fig. 2, no specification is aggregated with €0.00. Respondents in scenario 2 show the largest fraction of non-payers (45%). In addition, they are the only group where none of the respondents would pay €7.50. The premiums in scenarios 1 and 3 are similarly distributed, but scenario 1 increases towards the left (lower PP) whereas scenario 3 increases towards the right (higher PP). These descriptive comparisons imply that GHG emissions information has similar effects on respondents' WTPP but that more information may lead to higher PP. This is in line with our H2. Furthermore, our observation indicates that information solely on the GHG emissions without a comparison to less sustainable services is less likely to encourage a PP.

[Insert Fig. 2 about here]

Taken together, we observe different responses with respect to the willingness to pay compared to the amount of price premium (i.e., questions 17 and 18, respectively). About twice as many respondents chose to pay some amount of premium compared to their willingness to pay a premium. One possible explanation is that the respondents potentially expect higher premiums when answering question 17 than those actually offered in the following question, especially as €1.00 is a relatively small amount. Such explanation is in line with findings by Lim & Yoo (2014), where 70% of the participants are willing to pay the lowest PP (€0.36-€1.07), but only 15% agree to pay the highest PP (€2.85-€3.56).



## 4.2 Empirical analysis

To verify that participants are randomly assigned to the scenarios, we conduct a Kruskal-Wallis-test for the variable *sustainability importance*. The test shows no significant differences in means of *sustainability importance* across the three scenarios ( $T=3.0614$ ,  $df=2$ ,  $\alpha=5\%$ ), which is in line with random assignment.

In the main analysis, we investigate the association between service-level GHG emissions information (i.e., scenarios 1, 2 and 3) and WTPP and PP for a sustainable service. We perform Spearman's rank correlation tests.<sup>2</sup> Table 5 shows that the correlation coefficients between the scenarios and *WTPP* (*PP*) is 0.0084 (0.0149). Both coefficients are insignificant, so we cannot conclude that the *WTPP* nor *PP* are associated with the amount of service-level GHG emissions information provided to the customers. This implies that neither the *WTPP* nor *PP* increase with more information about GHG emissions. Thus, H1 and H2 are not supported.

[Insert Table 5 about here]

We find that fewer respondents indicate a WTPP in scenario 2 compared to scenarios 1 and 3. This suggests that information solely about the GHGs of the purchased service without a comparison to another service is less likely to impact the WTPP. Still, the Spearman rank correlations show no significant association between the WTPP and the amount of GHG emissions information provided to the customers. This stands in contrast with Chekima et al. (2016), who state that advertising enhances WTPP. Also O'Rourke & Ringer (2016) observe a positive association between sustainability information and the WTPP. The reason for different findings is potentially linked to the content of information. Our respondents indicated their

---

<sup>2</sup> Responses no specification are excluded from the analysis.

WTPP after receiving granular service-level GHG emissions information instead of more aggregated, firm-level sustainability information. Similarly, we find that the PP in scenario 2 is lower than in scenarios 1 and 3. However, the rank correlations suggest no significant association between the PP and the service-level GHG emissions information.

Next, we perform an additional analysis to investigate the association between customers' WTPP and their general sustainability awareness. For this, we compare participants belonging to regular customer segment and sustainable customer segment. The split is done for each of the three variables, whereby higher scores imply sustainable segment: *sustainability importance*, *sustainable purchases* and *sustainability information*. We compare the average WTPP and PP between the two segments using a Mann-Whitney U test. The findings are presented in Table 6.

[Insert Table 6 about here]

First, respondents with higher perceived sustainability importance in everyday life (i.e., sustainable segment based on *sustainability importance*) show significantly higher WTPP. As shown in Fig. 3, the regular segment has a mean WTPP of 1.96 as opposed to 3.08 in the sustainable segment. Similarly, Fig. 4 presents a significantly lower average PP (€1.05) for the regular segment compared to the sustainable one (€2.23). We find the same results for respondents who consider sustainability in their purchase decisions. In particular, the *sustainable purchases* split shows that the average WTPP (PP) in the regular segment is 1.30 points (€1.63) lower than in the sustainable segment. Finally, customers in the sustainable segment based on *sustainability information* have significantly higher WTPP but not PP. Specifically, the WTPP (PP) in the regular segment is 0.79 points (€0.54) lower compared to the sustainable segment but the latter is insignificant. While *sustainability information* shows

the smallest difference in *WTPP* and *PP* between the two customer segments, *sustainable purchases* shows the biggest difference between them.

[Insert Fig. 3 & 4 about here]

Our findings are in line with existing studies (e.g., Okada & Mais, 2010; Ottenbacher et al., 2019) as customers in the sustainable segment have higher *WTPP*. Hinnen et al. (2017) for example argue that customers in this segment show higher *WTPP* because individuals transfer their sustainable behavior into their purchase behavior. In addition, Ottenbacher et al. (2019) state that when an individual perceives sustainability as important and behaves accordingly, there is a higher chance that she is *WTPP*. Consistent with Laroche et al. (2001), we also find that the consideration of sustainability in purchase decisions (i.e., *sustainable purchases*) encourages a higher *WTPP*. Furthermore, we document that the *sustainability importance* and *sustainable purchase* (the consideration of sustainability and GHG emissions in purchase decisions) are significantly associated with the amount of *PP*. This is in line with Okada & Mais (2010), who suggest that customers with higher level of environmental consciousness pay higher *PP* than customers with lower level of environmental consciousness. Altogether, our findings suggest that the general attitudes towards sustainability issues and environmental concerns, and behaviors of customers likely encourage sustainable purchase decisions. On the other hand, our findings suggest that provision of service-level GHG emissions information has less influence on customers' *WTPP* and the *PP* amount.

Finally, we test for associations of customers' *WTPP* and sustainability importance with their demographic characteristics. In Table 7 we compare average *WTPP*, *PP* and *sustainability importance* between two groups based on *age*, *gender* and *employment*. The Mann-Whitney U test shows no statistically significant differences between the averages of the two groups. These

findings suggest that there is no association between any demographic variable and customers' WTPP and general sustainability importance.

[Insert Table 7 about here]

In line with Hinnen et al. (2017), Lim & Yoo (2014) and O'Connor et al. (2002) we find no significant association between age and the WTPP. While Laroche et al. (2001) show that gender relates to WTPP, our findings are in line with Hinnen et al. (2017), who find no relation between gender and sustainable purchase decisions. Similarly, we do not find a significant association between the demographic variables and the distribution among the two customer segments based on *sustainability importance*. This is in line with Hinnen et al. (2017) but in contrast with Ottenbacher et al. (2019), who show that gender influences the importance of sustainability for customers. Employment is also not related to the WTPP nor PP. However, the variable cannot be reasonably interpreted since the respondents are chiefly full-time students and, if at all, are pursuing part-time employment.

## **5 Summary and conclusion**

This study examines whether customers' purchase decisions are associated with the amount of service-level sustainability information provided to the customer at the time of purchase. In particular, we focus on passenger rail transport and GHG emissions information provided for a train ride. Our research question is relevant because firms (have to) disclose sustainability information on firm level, including GHG emissions information, but customers wish to clearly granular information on a product or service level. We therefore investigate whether customers' purchase decisions are associated with the amount of service-level GHG emissions information and with customers' general sustainability awareness. In particular, we analyze customers' WTPP and the PP amount using data from a survey.

Our descriptive findings show that 25% to 37% of the respondents are WTPP. This proportion is higher than in Hinnen et al. (2017) but lower than in O'Connor et al. (2002). We also find that the average PP ranges between €1.28 and €2.53. Compared to prior studies, the average PP as percentage of price (range between 2.57% and 5.05%) is lower (Aguilar & Vlosky, 2007; Drozdenko et al., 2011; Laroche et al., 2001). Our main results indicate no significant association between the amount of GHG emissions information and the WTPP nor the PP. This finding is not in line with our two hypotheses. The same lack of association is found between the WTPP and the PP, and demographic characteristics. However, we find significant associations between the general attitudes towards sustainability and behaviors of customers and the WTPP as well as the PP amount. Specifically, respondents who score highly on the importance of sustainability, the consideration of sustainability and GHG emissions in purchase decisions, and the value of sustainability information, also indicate higher WTPP. The results for PP are similar, but no association with the value of sustainability information is found.

Our results indicate that if a customer does not consider sustainability concerns and behaves accordingly, the provision of service-level GHG emissions information at the time of purchase cannot compensate for this and does not have sufficient influence on the resulting WTPP or the PP. In this way, we contribute to the debate how to encourage sustainable purchase decisions. For firms, this implies that addressing customers who already show general sustainability awareness is a more successful strategy. For policy makers, it means careful consideration of costs of granular reporting on product level against (lack of) benefits from encouraging customers' purchase of sustainable products labelled with detailed information. Our results suggest that raising general awareness about sustainability issues and creating knowledge about environmental concerns is necessary for encouraging sustainable purchase decisions and successfully combating climate change.

Our study has a few limitations. First, our sample has little variation in demographic characteristics, so the findings cannot be generalized to the wider population. Second, survey responses are not necessarily good predictors of actual purchase behavior (Drozdenko et al., 2011) because respondents tend to answer in a way that is considered appropriate by others (Bhattacharya & Sen, 2004; Ottenbacher et al., 2019). In addition, a reason could be that respondents neglect the costs related to changing actual purchase behavior (e.g., inconveniences faced in real life). Third, concurrent events in the society might influence the perceived importance of sustainability and environmental concerns. For example, the relocation of cities due to coal mining attracted a lot of media attention at the time our survey was conducted (ZDF, 2023b). Despite the limitations, we find it encouraging that, on average, 30% of the respondents show a WTPP because the higher it is, the higher the probability that it translates into actual purchase behavior. We leave it to future research to investigate a more-demographically-diverse sample in the same industry sector. Future research may also conduct observational studies that analyze real-life purchase decisions and the resulting WTPP and the PP amount.

## References

- Abrantes Ferreira, D., Gonçalves Avila, M., & Dias de Faria, M. (2010). Corporate social responsibility and consumers' perception of price. *Social Responsibility Journal*, 6(2), 208–221. <https://doi.org/10.1108/17471111011051720>
- Amel-Zadeh, A. & Serafeim, G. (2018). Why and how investors use ESG information: Evidence from a global survey. *Financial Analysts Journal*, 74(3), 87–103. <https://doi.org/10.2139/ssrn.2925310>
- Aguilar, F. X., & Vlosky, R. P. (2007). Consumer willingness to pay price premiums for environmentally certified wood products in the U.S. *Forest Policy and Economics*, 9(8), 1100–1112. <https://doi.org/10.1016/j.forpol.2006.12.001>
- Bhattacharya, C. B., & Sen, S. (2004). Doing Better at Doing Good: When, Why, and How Consumers Respond to Corporate Social Initiatives. *California Management Review*, 47(1), 9–24. <https://doi.org/10.2307/41166284>
- Biswas, A. (2016). A Study of Consumers' Willingness to Pay for Green Products. *Journal of Advanced Management Science*, 4(3), 211–215. <https://doi.org/10.12720/joams.4.3.211-215>
- BPB. (2021). *Ursachen und Folgen des Klimawandels*. BPB. <https://www.bpb.de/shop/zeitschriften/izpb/klima-347/336195/ursachen-und-folgendes-klimawandels/>
- Carrigan, M., & Attalla, A. (2001). The myth of the ethical consumer – do ethics matter in purchase behaviour? *Journal of Consumer Marketing*, 18(7), 560–578. <https://doi.org/10.1108/07363760110410263>
- Chekima, B., Chekima, S., Syed Khalid Wafa, S. A. W., Igau, O. A., & Sondoh, S. L. (2016). Sustainable consumption: the effects of knowledge, cultural values, environmental advertising, and demographics. *International Journal of Sustainable Development & World Ecology*, 23(2), 210–220. <https://doi.org/10.1080/13504509.2015.1114043>
- Cohn & Wolfe (2011). The 2011 green brand survey. [www.cohnwolfe.com/en/ideas-insights/white-papers/green-brands-survey-2011](http://www.cohnwolfe.com/en/ideas-insights/white-papers/green-brands-survey-2011), accessed May 25, 2023.
- Cone. (2004). *Multi-year study finds 21% increase in americans who say corporate support of social issues is important in building trust*. [www.yourtravelbiz.com/rta/CRTA%20Site%20Content/Resource%20Center/Resources/Third%20Party%20Articles/cone.pdf](http://www.yourtravelbiz.com/rta/CRTA%20Site%20Content/Resource%20Center/Resources/Third%20Party%20Articles/cone.pdf), accessed May 25, 2023.
- DB. (2022). *Deutsche Bahn - Integrierter Bericht 2022*. <https://ibir.deutschebahn.com/2021/de/download-center/>, accessed May 31, 2023.
- De Pelsmacker, P., Driesen, L., & Rayp Glenn (2005). Do Consumers Care about Ethics? Willingness to Pay for Fair-Trade Coffee. *The Journal of Consumer Affairs*, 39(2), 363-385. <https://doi.org/10.1111/j.1745-6606.2005.00019.x>
- Dobbs, S., & van Staden, C. (2016). Motivations for corporate social and environmental reporting: New Zealand evidence. *Sustainability Accounting, Management and Policy Journal*, 7(3), 449-472. <https://doi.org/10.1108/SAMPJ-08-2015-0070>
- Drozdenko, R. G., Jensen, M., & Coelho, D. (2011). Pricing of green products: premiums paid, consumer characteristics and incentives. *International Journal of Business, Marketing and Decision Sciences*, 4(1), 106-116.
- EC. (2016). *EU reference scenario 2016: Energy, transport and GHG emissions - trends to 2050*. EC.
- EC. (2023). *EU Emissions Trading System (EU ETS)*. [https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets\\_en](https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en)
- EU (2014). Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial

- and diversity information by certain large undertakings and groups. *Official Journal of the European Union*, L330(57), pp. 1–9.
- Gallego-Álvarez, I., & Quina-Custodio, I. A. (2016). Disclosure of corporate social responsibility information and explanatory factors. *Online Information Review*, 40(2), 218–238. <https://doi.org/10.1108/OIR-04-2015-0116>
- Hinnen, G., Hille, S. L., & Wittmer, A. (2017). Willingness to Pay for Green Products in Air Travel: Ready for Take-Off? *Business Strategy and the Environment*, 26(2), 197–208. <https://doi.org/10.1002/bse.1909>
- Hoffmann, E., Dietsche, C., & Hobelsberger, C. (2018). Between mandatory and voluntary: non-financial reporting by German companies. *NachhaltigkeitsManagementForum | Sustainability Management Forum*, 26(1-4), 47–63. <https://doi.org/10.1007/s00550-018-0479-6>
- KPMG. (2021). *The Six Pillars*. <https://kpmg.com/xx/en/home/insights/2021/09/the-six-pillars-new.html>, accessed March 11, 2023.
- Kuokkanen, H., & Sun, W. (2020). Companies, Meet Ethical Consumers: Strategic CSR Management to Impact Consumer Choice. *Journal of Business Ethics*, 166(2), 403–423. <https://doi.org/10.1007/s10551-019-04145-4>
- Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18(6), 503–520. <https://doi.org/10.1108/EUM00000000006155>
- Liesen, A., Hoepner, A. G., Patten, D. M., & Figge, F. (2015). Does stakeholder pressure influence corporate GHG emissions reporting? Empirical evidence from Europe. *Accounting, Auditing & Accountability Journal*, 28(7), 1047–1074. <https://doi.org/10.1108/AAAJ-12-2013-1547>
- Lim, H.-J., & Yoo, S.-H. (2014). Train travel passengers' willingness to pay to offset their CO2 emissions in Korea. *Renewable and Sustainable Energy Reviews*, 32(2), 526–531. <https://doi.org/10.1016/j.rser.2014.01.010>
- Mion, G., & Adai, C. R. L. (2020). The Effect of Mandatory Publication of Nonfinancial Disclosure in Europe on Sustainability Reporting Quality: First Insights about Italian and German Companies. In L. Songini, A. Pistoni, P. Baret, & M. H. Kunc (Eds.), *Studies in Managerial and Financial Accounting. Non-Financial Disclosure and Integrated Reporting: Practices and Critical Issues*, 34, 55–80. Emerald Publishing Limited. <https://doi.org/10.1108/S1479-351220200000034005>
- O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who Wants to Reduce Greenhouse Gas Emissions? *Social Science Quarterly*, 83(1), 1–17. <https://doi.org/10.1111/1540-6237.00067>
- Okada, E. M. & Mais, E. L. (2010) Framing the "Green" alternative for environmentally conscious consumers. *Sustainability Accounting, Management and Policy Journal*, 1(2), 222-234. <https://doi.org/10.1108/20408021011089257>
- O'Rourke, D., & Ringer, A. (2016). The Impact of Sustainability Information on Consumer Decision Making. *Journal of Industrial Ecology*, 20(4), 882–892. <https://doi.org/10.1111/jiec.12310>
- Ottbacher, M. C., Kuechle, G., Harrington, R. J., & Kim, W.-H. (2019). QSR customer sustainable behaviors and brand practice perceptions on willingness to pay a premium. *International Hospitality Review*, 33(2), 106–125. <https://doi.org/10.1108/IHR-03-2019-0006>
- Our World in Data. (2020a). *Cars, planes, trains: where do CO2 emissions from transport come from?* <https://ourworldindata.org/co2-emissions-from-transport>, accessed March 11, 2023.



- Our World in Data. (2020b). *Sector by sector: where do global greenhouse gas emissions come from?* <https://ourworldindata.org/ghg-emissions-by-sector>, accessed March 11, 2023.
- Rao, A. R., & Bergen, M. E. (1992). Price Premium Variations as a Consequence of Buyers' Lack of Information. *Journal of Consumer Research*, 19(3), 412-423. <https://doi.org/10.1086/209311>
- Schröder, P. (2021). Corporate social responsibility (CSR) website disclosures: empirical evidence from the German banking industry. *International Journal of Bank Marketing*, 39(5), 768–788. <https://doi.org/10.1108/IJBM-06-2020-0321>
- Statista. (2022a). *Entwicklung des Modal Split im Personenverkehr in Deutschland in den Jahren 2013 bis 2024* <https://de.statista.com/statistik/daten/studie/168397/umfrage/modal-split-im-personenverkehr-in-deutschland/>, accessed May 25, 2023.
- Statista. (2022b). *Market shares of DB AG and competitors in the transport performance in long-distance passenger rail in Germany from 2005 to 2020.* <https://www.statista.com/statistics/934783/market-shares-deutsche-band-competitors-long-distance-rail-germany/>, accessed May 25, 2023.
- Statista. (2022c). *Market shares of Deutsche Bahn AG competitors in regional rail transport in Germany from 2010 to 2020.* <https://www.statista.com/statistics/934883/deutsche-bahn-competitors-market-share-regional-rail-transport-germany/>, accessed May 25, 2023.
- Statistisches Bundesamt. (2022). *Passenger transport.* <https://www.destatis.de/EN/Themes/Economic-Sectors-Enterprises/Transport/Passenger-Transport/Tables/passengers-carried.html>, accessed January 12, 2023.
- Trudel, R., & Cotte, J. (2009). Does it pay to be good. *MIT Sloan Management Review*, 50(2), pp. 61–68.
- Umweltbundesamt. (2023). *Emissionsdaten.* <https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten>, accessed May 11, 2023.
- UN. (2015a). The Addis Ababa Action Agenda <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2051&menu=35>, accessed October 8, 2021.
- UN (2015b). World leaders to gavel universal agenda to transform our world for people and planet. <https://www.un.org/sustainabledevelopment/blog/2015/09/summit-charts-new-era-of-sustainable-development-world-leaders-to-gavel-universal-agenda-to-transform-our-world-for-people-and-planet>, accessed October 8, 2021.
- Yara. (2023). *Strong European consumer demand for sustainable food.* <https://www.yara.com/corporate-releases/strong-european-consumer-demand-for-sustainable-food/>, accessed May 22, 2023.
- ZDF. (2023a). *Daten zum Klimawandel im Überblick.* <https://www.zdf.de/nachrichten/politik/klimawandel-deutschland-welt-folgen-daten-100.html>, accessed May 25, 2023.
- ZDF. (2023b). *So ist die Stimmung in Lützerath kurz vor der Räumung.* <https://www.zdf.de/uri/de44bbb3-eafe-4e6b-8ac1-03b78a3ffd15>, accessed March 10, 2023.

## Appendix

**Table A1: Questionnaire development**

1. Development of questions
2. Check by experienced researcher 1
3. First revision of questions
4. Check by a research assistant
5. Second revision of questions
6. Check by experienced researcher 2
7. Third revision of questions
8. Upload on survey platform
9. Check by a research assistant
10. Fourth revision of questions
11. Check by experienced researcher 1
12. Fifth revision of questions
13. Check by experienced researcher 1 and experienced researcher 3
14. Final revision of questions

**Table A2: Questionnaire**

Introduction	
<p>Sustainability in an ecological context stands for a considerate approach to the environment and its natural resources. Sustainable action includes, for example, the conscious avoidance of products that have a negative impact on the environment through their value chain or use.</p> <p>CO<sub>2</sub>e emissions include various greenhouse gases, for example, carbon dioxide, methane, and nitrous oxide. The emission of greenhouse gases into the atmosphere resulting from the manufacture and use of products and services contributes significantly to global warming.</p>	
Question block 1	
<ol style="list-style-type: none"> <li>1. Sustainability is a topic that is important to me.</li> <li>2. Sustainability is a topic that is important for our society.</li> <li>3. Sustainability plays a role in my everyday life.</li> <li>4. I actively include sustainability in my everyday decisions.</li> <li>5. Sustainability influences my purchase decisions.</li> </ol>	<p>Strongly agree (5)            Rather agree (4)            Neutral (3)            Rather disagree (2)            Strongly disagree (1)            No specification (0)</p>
Question block 2	
<ol style="list-style-type: none"> <li>6. The sustainability of a product or service is important for my purchase decision.</li> <li>7. The sustainability of a firm is important for my purchase decision.</li> <li>8. The CO<sub>2</sub>e emissions that arise from products or services are important for my purchase decisions.</li> <li>9. I am willing to pay a premium for products or services if compared with their alternatives they show more sustainable characteristics (for example for products made from organic or recycled materials).</li> <li>10. I am willing to pay a premium for products or services if they come from a firms that is more sustainable compared to others.</li> <li>11. I am willing to pay a premium for products or services if compared to others less CO<sub>2</sub>e emissions arise from them.</li> </ol>	<p>Strongly agree (5)            Rather agree (4)            Neutral (3)            Rather disagree (2)            Strongly disagree (1)            No specification (0)</p>

Question block 3	
<p>12. Sustainability influences my purchase decisions.</p> <p>13. It is important to me that firms inform me about the sustainability of their products and services.</p> <p>14. It is important to me that firms inform me about the sustainability if their value chain.</p> <p>15. I actively search for information about the sustainability of a product or service.</p>	<p>Strongly agree (5)</p> <p>Rather agree (4)</p> <p>Neutral (3)</p> <p>Rather disagree (2)</p> <p>Strongly disagree (1)</p> <p>No specification (0)</p>
<p>16. How high would you estimate the effort you put into informing yourself about the sustainability of a product or service?</p>	<p>Very high (5)</p> <p>Rather high (4)</p> <p>Average (3)</p> <p>Rather low (2)</p> <p>Very low (1)</p> <p>No specification (0)</p>
Question block 4	
<p>The submission of an assignment where you participated was nominated for an award. To go to the award ceremony, the university is inviting you to travel to Berlin from Friday till Sunday. The university pays for the accommodation, the train tickets which cost €50, and each participant gets €60 pocket money. The pocket money is free to use.</p> <p>You visit the website of the Deutsche Bahn to book your train ticket. Just before making the payment, you take notice of an information:</p> <p>Scenario 1: Thank you for travelling by train and thus protecting the environment.</p> <p>Scenario 2: Thank you for travelling by train and thus protecting the environment. This ride emits 0.12 kg CO<sub>2</sub>e.</p> <p>Scenario 3: Thank you for travelling by train and thus protecting the environment. This ride emits 0.12 kg CO<sub>2</sub>e. If you were to travel by car, you would emit about 109 kg CO<sub>2</sub>e.</p> <p>17. How likely is it that you pay a premium on the price of the train ticket when using your pocket money for it? The Deutsche Bahn commits to use the income from the premium to invest in sustainability projects.</p>	<p>Very likely (5)</p> <p>Rather likely (4)</p> <p>Neutral (3)</p> <p>Rather unlikely (2)</p> <p>Very unlikely (1)</p> <p>No specification (0)</p>
<p>18. How high is the premium you would be willing to pay?</p>	<p>€7.50 (5)</p> <p>€5.00 (4)</p> <p>€2.50 (3)</p> <p>€1.00 (2)</p> <p>I do not want to pay a premium (1)</p> <p>No specification (1)</p>

Question block 5	
19. How old are you?	20 or younger (4) 21 – 23 (3) 24 – 26 (2) 27 or older (1) No specification (0)
20. Which gender do you belong to?	Male Female Diverse No specification
21. How much income do you earn from work?	I do not work. (3) Up to €520 (2) More than €520 (1) No specification (0)

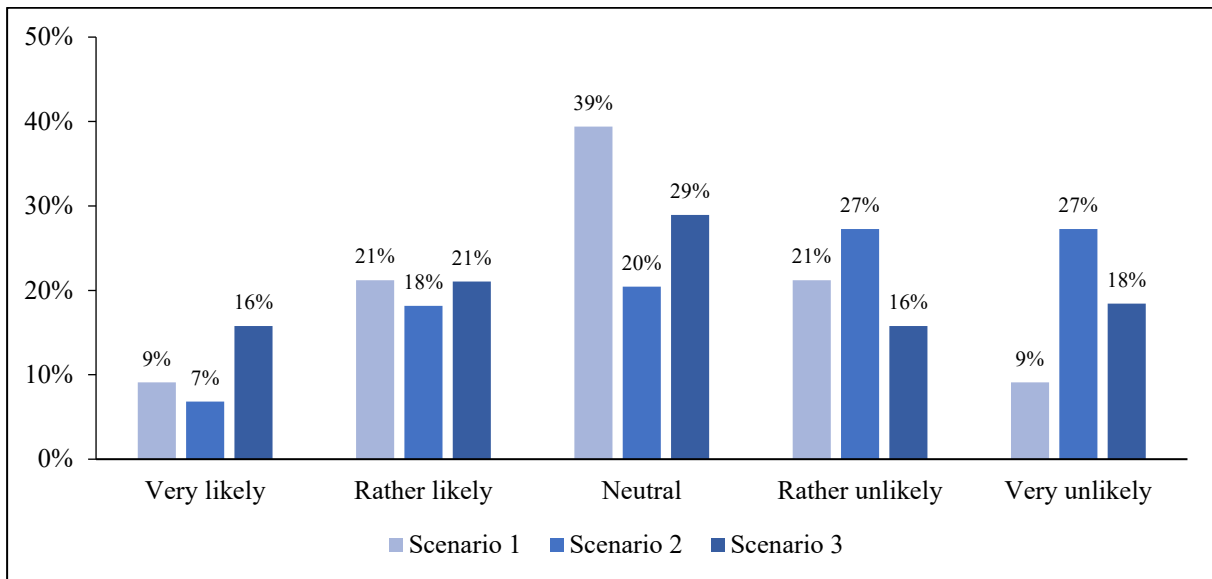
**Note:** The values for CO<sub>2</sub>e emission are adopted from *UmweltMobilCheck*, based on the data for a train ride from the location of the university to Berlin central station on 16 December 2022, in the afternoon, and from Berlin central station to the location of the university on 18 December 2022, in the afternoon.

**Table A3:** Assignment of participants to sustainable and regular customer segment

Question block	Range of aggregate score	Middle of range
1	5-25	15
2	6-30	18
3	4-20	12

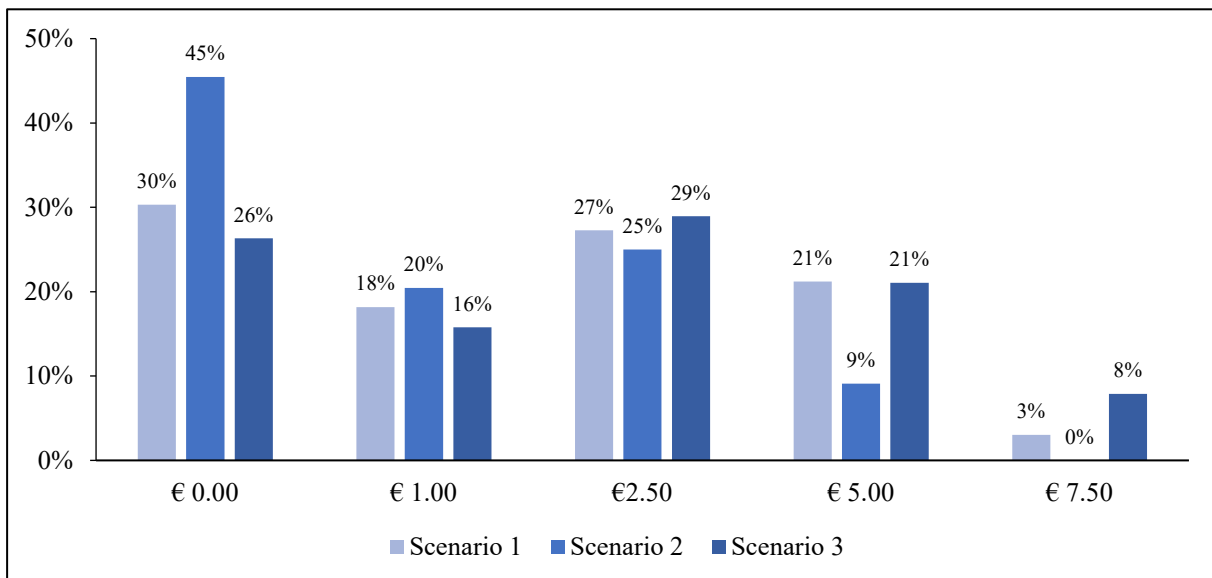
**Note:** We split participants into sustainable customer segment and regular customer segment based on their aggregate score of responses to questions in blocks 1, 2 and 3. A participant's aggregate score per block is the sum of responses on a five-point Likert scale (as shown in Table A2) to all questions in the block. The table shows the lowest and the highest possible aggregate score and the respective middle of the range. Participants with aggregate score higher than the middle of the range are assigned to the sustainable segment and other participants to the regular segment.

## Figures



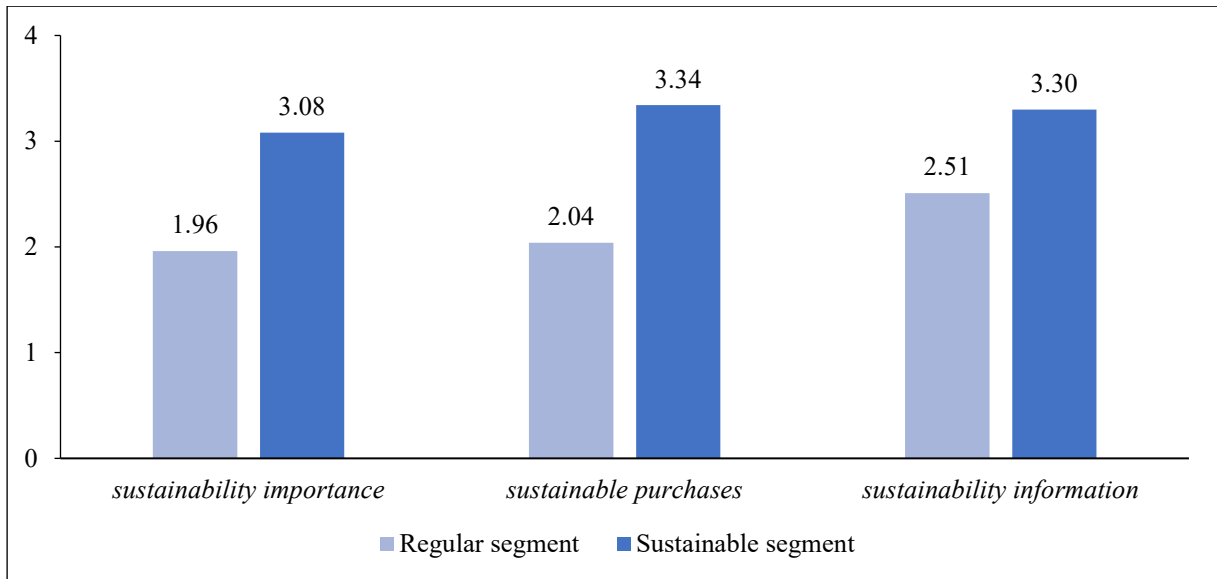
**Fig. 1** Willingness to pay a price premium

**Note:** This figure shows the distribution of respondents' WTPP in the different scenarios in relative terms.



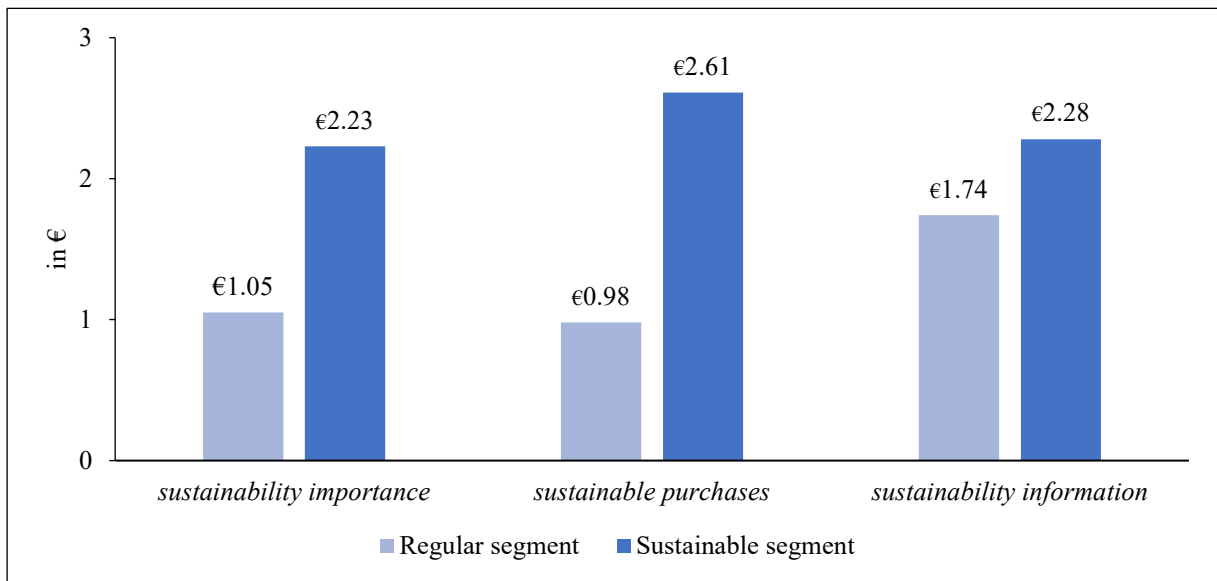
**Fig. 2** Price premium

**Note:** This figure shows the distribution of the amount of PP that respondents would pay in the different scenarios in relative terms.



**Fig. 3** Average WTPP for the regular and sustainable customer segment

**Note:** This figure shows the average WTPP for the regular and sustainable customer segment. The two segments are based on variables *sustainability importance*, *sustainability purchases* and *sustainability information* as explained in Table A3 in the Appendix.



**Fig. 4** Average amount of PP for the regular and sustainable customer segment

**Note:** This figure shows the average PP for the regular and sustainable customer segment. The two segments are based on variables *sustainability importance*, *sustainability purchases* and *sustainability information* as explained in Table A3 in the Appendix.

## Tables

**Table 1:** Demographic characteristics of the sample

<i>age</i>			
	20 or younger	81	70%
	21 – 23	23	20%
	24 – 26	5	4%
	27 or older	6	5%
	No specification	0	0%
<i>gender</i>			
	Male	53	46%
	Female	58	50%
	Diverse	2	2%
	No specification	2	2%
<i>income</i>			
	Unemployed	45	39%
	Up to €520	40	35%
	More than €520	22	19%
	No specification	8	7%

**Note:** This table shows the respondents' demographic characteristics in absolute and relative terms. N=115

**Table 2:** Descriptive statistics

Panel A: Respondents' perceived sustainability importance

Likert score	Q1	Q2	Q3	Q4	Q5	Total
5	25	77	12	10	7	131
	21%	66%	10%	8%	6%	22%
4	66	24	42	23	41	196
	57%	20%	36%	20%	35%	34%
3	16	7	42	49	31	145
	13%	6%	36%	42%	26%	25%
2	4	3	13	23	23	66
	3%	2%	11%	20%	20%	11%
1	4	4	6	10	13	37
	3%	3%	5%	8%	11%	6%
Average score	3.90	4.45	3.36	3.00	3.05	3.55

**Note:** This table shows frequencies of responses to questions in block 1 in absolute and relative terms. The average response of a participant to all questions in block 1 represents variable *sustainability importance*. The questions can be found in Table A2 in the Appendix. Score ranges from 5 (very likely) to 1 (very unlikely). N=115

**Panel B: Respondents' consideration of sustainability in purchases**

Likert score	Q6	Q7	Q8	Q9	Q10	Q11	Total
5	5	5	8	18	10	13	59
	4%	4%	6%	15%	8%	11%	8%
4	44	31	19	41	37	41	213
	38%	26%	16%	35%	32%	35%	30%
3	34	36	46	20	32	28	196
	29%	31%	40%	17%	27%	24%	28%
2	23	30	25	18	17	16	129
	20%	26%	21%	15%	14%	13%	18%
1	9	13	17	18	19	17	93
	7%	11%	14%	15%	16%	14%	13%
Average score	3.11	2.87	2.79	3.20	3.02	3.15	3.02

**Note:** This table shows frequencies of responses to questions in block 2 in absolute and relative terms. The average response of a participant to all questions in block 2 represents variable *sustainable purchases*. The questions can be found in Table A2 in the Appendix. Score ranges from 5 (very likely) to 1 (very unlikely). N=115

**Panel C: Respondents' perceived importance of sustainability information**

Likert score	Q12	Q13	Q14	Q15	Q16	Total
5	6	22	16	5	4	53
	5%	19%	13%	4%	3%	9%
4	47	49	41	11	10	158
	40%	42%	35%	9%	8%	27%
3	24	27	35	24	34	144
	20%	23%	30%	20%	29%	25%
2	26	9	15	39	41	130
	22%	7%	13%	33%	35%	22%
1	12	8	8	36	25	89
	10%	6%	6%	31%	21%	15%
0	0	0	0	0	1	1
	0%	0%	0%	0%	0%	0%
Average score	3.08	3.59	3.37	2.22	2.34	2.92

**Note:** This table shows frequencies of the responses to questions in block 3 in absolute and relative terms. The average response of a participant to all questions in block 3 represents variable *sustainability information*. The questions can be found in Table A2 in the Appendix. Score ranges from 5 (very likely) to 1 (very unlikely); (0 means no specification). N=115



**Table 3: Willingness to pay a price premium**

Likert score	Scenario 1	Scenario 2	Scenario 3	Total
5	3 9%	3 7%	6 16%	12 10%
4	7 21%	8 18%	8 21%	23 20%
3	13 39%	9 20%	11 29%	33 29%
2	7 21%	12 27%	6 16%	25 22%
1	3 9%	12 27%	7 18%	22 19%
Total	33	44	38	115
Average	3.00	2.50	3.00	2.81

**Note:** This table shows frequencies of the responses to question about WTPP in absolute and relative terms for the total sample and in each scenario. The question can be found in Table A2 in the Appendix. Score ranges from 5 (very likely) to 1 (very unlikely). N=115

**Table 4: Price premium**

	Scenario 1	Scenario 2	Scenario 3	Total
€ 0.00	5 15%	14 32%	9 24%	28 24%
€ 1.00	6 18%	9 20%	6 16%	21 18%
€ 2.50	9 27%	11 25%	11 29%	31 27%
€ 5.00	7 21%	4 9%	8 21%	19 17%
€ 7.50	1 3%	0 0%	3 8%	4 3%
No specification	5 15%	6 14%	1 3%	12 10%
Total	33	44	38	115
Average	€ 2.15	€ 1.28	€ 2.53	€ 2.15

**Note:** This table shows frequencies of the responses to question about PP in absolute and relative terms for the total sample and in each scenario. The question can be found in Table A2 in the Appendix. N=115

**Table 5:** Association between the three scenarios and customer behavior

scenarios		Correlation coefficient	Significance (p <0.025)
	<i>WTPP</i>	0.0084	No
	<i>PP</i>	0.0149	No

**Note:** This table shows the Spearman rank correlation test between the three scenarios (varying in the amount of service-level GHG emissions information provided to customers) and the *WTPP* and the *PP*. It shows the correlation coefficients and the respective significance level. N=115

**Table 6:** Association between the general sustainability awareness and customer behavior

		Regular segment Mean (SD)	Sustainable segment Mean (SD)	Significance (p <0.025)
<i>sustainability importance</i>	<i>WTPP</i>	1.96 (1.04)	3.08 (1.20)	Yes
	<i>PP</i> (€)	1.05 (1.69)	2.23 (2.09)	Yes
<i>sustainable purchases</i>	<i>WTPP</i>	2.04 (1.04)	3.34 (1.11)	Yes
	<i>PP</i> (€)	0.98 (1.55)	2.61 (2.10)	Yes
<i>sustainability information</i>	<i>WTPP</i>	2.51 (1.29)	3.30 (1.04)	Yes
	<i>PP</i> (€)	1.74 (2.10)	2.28 (1.95)	No

**Note:** This table shows the difference-in-means test using the Mann-Whitney U test. It shows the means of the *WTPP* and the *PP* for the regular and sustainable customer segment, and the respective significance level of the difference. The two segments are based on variables *sustainability importance*, *sustainable purchases* and *sustainability information* as explained in Table A3 in the Appendix. N=115

**Table 7:** Association between the demographic characteristics and customer behavior

		Mean (SD)		Significance (p <0.025)
<i>age</i>		Young	Old	
	<i>WTPP</i>	2.73 (1.19)	3.00 (1.39)	No
	<i>PP</i> (€)	1.39 (2.03)	1.99 (2.15)	No
	<i>sustainability importance</i>	17.35 (4.03)	18.76 (3.77)	No
<i>gender</i>		Male	Female	
	<i>WTPP</i>	2.68 (1.28)	3.00 (1.12)	No
	<i>PP</i> (€)	1.61 (1.97)	2.29 (2.08)	No
	<i>sustainability importance</i>	16.79 (4.44)	18.57 (3.35)	No
<i>employment</i>		Employed	Unemployed	
	<i>WTPP</i>	2.89 (1.32)	2.71 (1.14)	No
	<i>PP</i> (€)	1.77 (2.05)	2.16 (2.15)	No
	<i>sustainability importance</i>	17.40 (4.32)	18.16 (3.53)	No

**Note:** This table shows the difference-in-means test using the Mann-Whitney U test. It shows the means of the *WTPP*, the *PP* and *sustainability importance* for splits in *age*, *gender* and *employment*, and the respective significance level of the difference. N=115