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Exploring consumer attitudes toward reusable takeaway packaging: An empirical study in Germany

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ABSTRACT

Since the introducing of the new German packaging law 'VerpackG2' in January 2023, food service operators in Germany selling takeout food have been mandated to provide reusable packaging alternatives to single-use plastic food containers. This change in legislation has led to the emergence of various reusable consumer packaging systems in the German market. Reusable packaging systems have the potential to significantly reduce the negative environmental impact of single-use plastic packaging. However, for these systems to succeed and achieve their desired positive environmental impact, a comprehensive understanding of consumer behavior toward these systems is needed. This study extends the Theory of Planned Behaviour (TPB) framework to identify the factors influencing consumers' intentions to use a reusable packaging system for takeaway food in the German food service industry. An online survey was developed, and 153 valid responses were collected from consumers in Germany. Structural equation modeling revealed that in this study, consumers' personal moral norms, attitudes, subjective norms, and perceived behavioral control directly influence consumers' intentions to use the reusable packaging system. The results also show that context, motivation, and personal moral norms are positively related to consumers' attitudes, and context significantly positively affects consumers' perceived behavioral control. Furthermore, the study's results indicate that despite the high frequency of takeaway food orders in Germany, consumers' use of reusable packaging systems for takeaway food still needs to be improved.

***Keywords**: Circular economy; reuse; packaging; food industry; sustainable behaviour.*

1 Introduction

Each year, approximately fourteen million tons of plastic are discarded (over the rivers) into the ocean; the land-based sources come from urban and stormwater runoff, sewer overflows, littering, inadequate waste disposal and management, industrial activities, tire abrasion, construction, and illegal dumping (IUCN 2021). The food and beverage packaging industry significantly contributes to plastic waste, which pollutes our environment (Kochańska et al., 2021). In 2015, the global packaging industry produced about 4,300 billion units, of which approximately 73% accounted for food and beverage packaging (ALL4PACK, 2022). European waste legislation aims to promote sustainable packaging consumption by encouraging changes in consumer behavior. (Greenwood et al., 2021; WWF, 2023). Since 1994, the European Union has mandated that packaging be reusable, recyclable, or recoverable (European Union, 1994). In Germany, these EU laws are translated into directives and standards on a national level, which promote reuse systems through reuse pilot programs, restrictions on single-use packaging, and standards for reuse systems (Ellen MacArthur Foundation, 2022). They also establish quantitative targets to increase the proportion of reusable packaging on the market and expand the corresponding reusable systems (Rödig et al., 2022). In January 2023, the German packaging law VerpackG2 was amended, making it mandatory for all German food service businesses that sell takeaway food to provide reusable packaging alternatives for their disposable plastic food packaging (Bundesumweltministerium, 2023), resulting in the emergence of various Reusable Packing Systems (RPS) for consumers on the German market. Participation in a pooling system, where an external service provider administers and supports the food service businesses using reusable packaging for takeaway food consumption (Bundesumweltministerium, 2023), is becoming increasingly popular among German food service businesses. However, even though the change in German law forces businesses in the German food service industry to provide reusable packaging solutions, the final decision to use reusable food packaging remains with the consumer. It is important to understand how consumers use RPS and what factors positively influence their choice. This study aims to identify these factors and draw conclusions about their relationships to understand how consumer reuse behavior can be positively influenced. Specifically, the study focuses on customers' intention to use a pooling system that provides reusable packaging in the German food service industry for takeaway food consumption.

2 Theoretical Background and Conceptual Model

2.1 Theory of Planned Behaviour (TPB)

The Theory of Planned Behavior (TPB) is an extension of the Theory of Reasoned Action (TRA) developed by Ajzen and Fishbein (1980, 1991). The TRA suggests that a person's behavior is primarily influenced by their behavioral intention, especially in situations they can control. It identifies four key constructs:

1. Attitude towards the behavior: This refers to the individual's positive or negative evaluation of performing the behavior.
2. Subjective norm: This encompasses the perceived social pressure to engage or not engage in the behavior.
3. Behavioral intention: This reflects the individual's readiness to perform the behavior, directly predicting actual behavior.
4. Behavior: This is the action itself.

The TPB expands on the TRA by adding a third component: perceived behavioral control (PBC). This component accounts for external factors that may affect a person's ability to perform the behavior, providing a more comprehensive understanding of how different factors influence intentions and actions. Depending on the situation, attitude, and behavior, either Subjective Norm or PBC could be more significant in predicting intentions that lead to behavior (Odhiambo Owino, 2019). Attitude is directly influenced by a person's intention to behave in a certain way, especially in situations under their control. Behavioral intention indicates a person's willingness and effort to perform a behavior. Subjective norms refer to a person's perceived social pressure to perform or not perform a behavior. PBC is a person's belief about how easy or difficult it is to perform a specific behavior (Ajzen and Madden, 1986). The degree of control people have over their behavior is reflected in their access to and ownership of resources like skills, assets, and time (Odhiambo Owino, 2019).

Furthermore, TPB suggests that higher PBC and greater motivation make it more likely for a person to perform a behavior (Ajzen, 1991). Moral norms are socially determined values attached to a particular behavior. Personal norms are internalized values reflecting an individual's moral obligations. Studies have shown that adding the moral norm construct to the TPB framework increases the predictability of Pro-Environmental Behavior (PEB)

(Jackson, 2005). PEB refers to behavior that minimizes or benefits harm to the environment (Steg and Vlek, 2009). Behavioral intentions are a person's readiness to perform a behavior and are considered the immediate precursor to behavior. Motivations are internal or external factors that drive an individual to behave in a certain way or take a specific action. The motivation to participate in PEBs is thought to be primarily driven by internal factors (Novoradovskaya et al., 2020; van der Werff et al., 2013). Contextual factors are external influences that impact the execution of a behavior by either facilitating or constraining it. These factors can include various skills, opportunities, or resources needed to perform a behavior, such as physical infrastructure or the availability of specific products (Jackson, 2005; Steg and Vlek, 2009). In addition to intra-personal factors like attitudes and Personal Moral Norm (PMN), there is increasing recognition of the importance of including contextual factors when understanding PEBs (Steg and Vlek, 2009).

2.2 Conceptual model and hypotheses

According to the TPB proposed by Ajzen (1991), attitudes, subjective norms, and PBC directly impact behavioral intentions, which in turn predict actual behavior. The stronger the intentions, the higher the probability of an individual performing the desired behavior. This study does not investigate actual behavior but focuses on measuring behavioral intentions as a critical predictor of PEB, which is consumers' intention to use an RPS. This research further expands the TPB by adding other variables, such as context, motivation, and PMN, into the model (Figure 1).

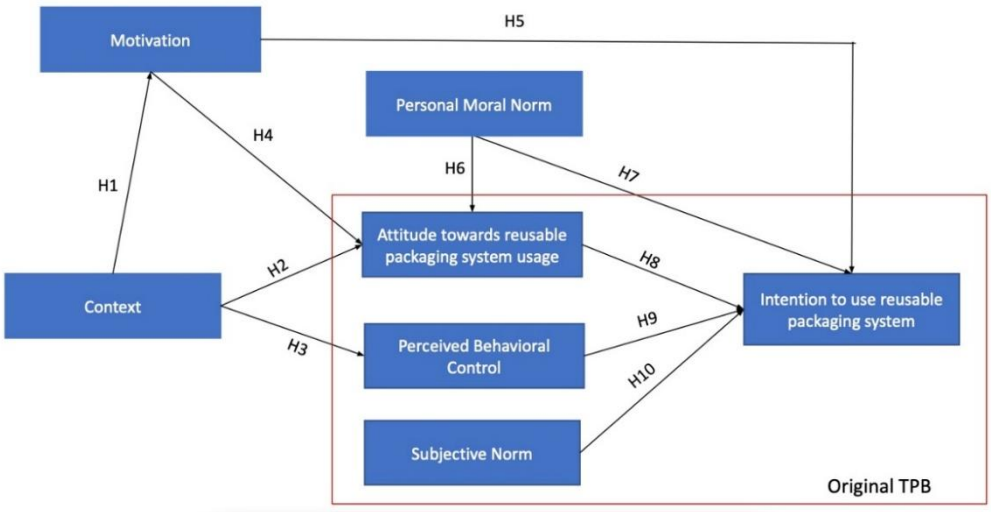

Figure 1. Conceptual model. From: Own source

Based on the literature review and the proposed model, the following hypotheses are proposed:

Context

H1: Consumers' perception of the context is positively related to consumers' motivation to use the reusable packaging system.

H2: Consumers' perceptions about the context positively relate to their attitudes towards using the reusable packaging system.

H3: Consumers' perception of the context is positively related to the consumers' perceived behavioral control.

Motivation

H4: Consumers' motivation to use the reusable packaging system is positively related to consumers' attitudes towards the use of the reusable packaging system.

H5: Consumers' motivation to use the reusable packaging system is positively related to consumers' intention to use the reusable packaging system.

Moral norm

H6: Consumers' personal moral norms are positively related to consumers' attitudes towards the use of the reusable packaging system.

H7: Consumers' personal moral norms are positively related to consumers' intention to use the reusable packaging system.

Attitudes
H8: Consumers' attitudes towards the use of the reusable packaging system are positively related to consumers' intention to use the reusable packaging system.

Subjective Norm
H9: Consumers' subjective norm is positively related to consumers' intention to use the reusable packaging system.

Perceived Behavioural Control
H10: Consumers' perceived behavioral control is positively related to consumers' intention to use the reusable packaging system.

3 Methods

This study adopted a mixed-method approach, comprising a literature review on consumer behavior, reusable packaging, and RPSs. It identified the consumer perspectives and factors predicting customers' intention to use an RPS for their takeaway food.

3.1 Data collection

An online survey was conducted using the web-based survey software Unipark to collect data. To ensure the survey questions were clear and easily understood, a pilot study with 10 participants was performed (Malhotra et al., 2017). The survey was administered in German, and a total of 178 responses were gathered, with 153 responses selected for further analysis (table 1).

Table 1.
Respondents profile.

Demographics	Count	%
Gender		
Female	85	55,6
Male	65	42,5
Diverse	3	2
Education		
Secondary school or vocational school	13	8,5
Vocational training	28	18,3
Higher education	98	64,1
Postgradate studies	10	6,5
Others	4	2,6
Total	153	100

Median Age= 31; ranged from 18 to 83; SD= 15

The survey was designed to gather information from takeaway consumers in Germany. It was distributed online through various social media platforms such as Instagram, Facebook, and LinkedIn, and through mail distribution lists related to work and study. The survey included questions about ordering frequency, previous experience with takeaway food, and the use of reusable packaging systems (RPS). The primary constructs of the Theory of Planned Behavior (TPB) were measured using Likert scales, including intention to use RPS, attitude towards RPS, subjective norm, and perceived behavioral control (PBC). Contextual factors, personal moral norm (PMN), and motivation were also evaluated. The survey used scales adapted from previous research to measure behavioral intention and PMN, and participants were asked about their motivations for using RPS (such as saving money or helping the environment). Attitudes were measured by identifying factors influencing usage. The subjective norm construct included injunctive and descriptive norms, which were measured using adapted items from previous studies. The construct of PBC was measured using items adapted from Ertz et al. (2017). Finally, participants were asked to provide socio-demographic information such as gender, age, and education level. Previous research has shown that these demographics are linked to sustainable consumption behaviors and are predictors of pro-environmental behaviors (Appendix).

3.2 Data analysis

Partial least squares structural equation modeling (PLS-SEM) was applied to assess the proposed conceptual model (Figure 1) using SmartPLS and SPSS software.

4 Results and Discussion

4.1 Reliability and validity analysis

Four criteria were used to assess the measurement model and test for reliability and validity: internal consistency reliability with factor loadings and composite reliability (CR), convergent validity using AVE, and discriminant validity with Heterotrait-Monotrait Ratio HTMT (Table 3).

Table 2.
Composite Reliability and Average Variance Extracted

Variables	Composite Reliability (CR)	Average Variance Extracted (AVE)
CON	0.962	0.893
MOT	0.827	0.550
PMN	0.885	0.613
ATT	0.919	0.621
SN	0.939	0.793
PBC	0.817	0.604
INT	0.943	0.847

The measurement scales' internal reliability was confirmed using an assessment of the composite reliability, as outlined by Henseler et al. (2009). Table 2 shows that all seven constructs (context, motivation, PMN, attitude, subjective norm, PBC, and intention) displayed CR values above the cut-off value of 0.7, indicating that the measurement model is reliable. Convergence validity was assessed using the average variance extracted (AVE). The AVE values for the constructs (context, PMN, attitude, subjective norm, PBC, and intention) were all higher than the desired value of 0.5, indicating a good fit for the model. The AVE values were as follows: context (0.893), PMN (0.613), attitude (0.621), subjective norm (0.793), PBC (0.604), and intention (0.847).

Table 3
Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT) - Matrix

Variables	ATT	CON	INT	MOT	PBC	PMN	SN
ATT							
CON	0.113						
INT	0.715	0.088					
MOT	0.483	0.082	0.294				
PBC	0.522	0.428	0.702	0.306			
PMN	0.682	0.038	0.656	0.295	0.351		
SN	0.703	0.110	0.592	0.242	0.373	0.556	

Finally, the heterotrait-monotrait (HTMT) method is used to examine the discriminant validity of the model (J. Hair et al., 2017). According to the results presented in Table 5, all values fall below the desired threshold of 0.85, ranging from 0.038 to 0.715 (J. Hair et al., 2017). Therefore, the measurement model's discriminant validity was satisfied in this study.

4.2 Structural model

The structural model was analyzed by applying the PLS-SEM algorithm and bootstrapping. This analysis involved the assessment of multicollinearity, the evaluation of the model's predictive relevance, and the hypotheses testing. The structural model is presented in Figure 2 and displays all outer loadings for the adjusted model. The outer loadings for the construct of context, which consists of three items, ranged from 0.939 to 0.952. For the construct of motivation, which holds four items, loadings ranged from 0.617 to 0.866. Personal moral norm showed factor loadings ranging from 0.525 to 0.888 for its five items. The attitude construct consists of seven items with outer loadings ranging from 0.671 to 0.868. Moreover, the construct of PBC, comprising three items, showed loadings ranging from 0.531 to 0.892. The outer loadings for the construct of intention, which incorporates three items, ranged from 0.909 to 0.927. In general, the loadings in the model are considered highly satisfactory, demonstrating the fulfillment of the individual item reliability criterion (J. Hair et al., 2014). The results of the hypothesis testing (Table 5) indicate that all hypotheses (see 1.2 Conceptual model and hypotheses), except H1 and H2, are supported. The values for β, t, and p are as follows: β= 0.055, t= 0.548, p= 0.280; β= -0.027, t= 0.403,

p= 0.343. This suggests that consumers' perception of the context is positively related to their attitudes towards using the RPS and their PBC (H2 and H3). Additionally, hypothesis four assesses whether consumers' motivation to use the RPS is positively related to their attitudes towards the use of the RPS. The results show that motivation significantly and positively impacts attitude (β = 0.350, t= 6.240, p< 0.001).

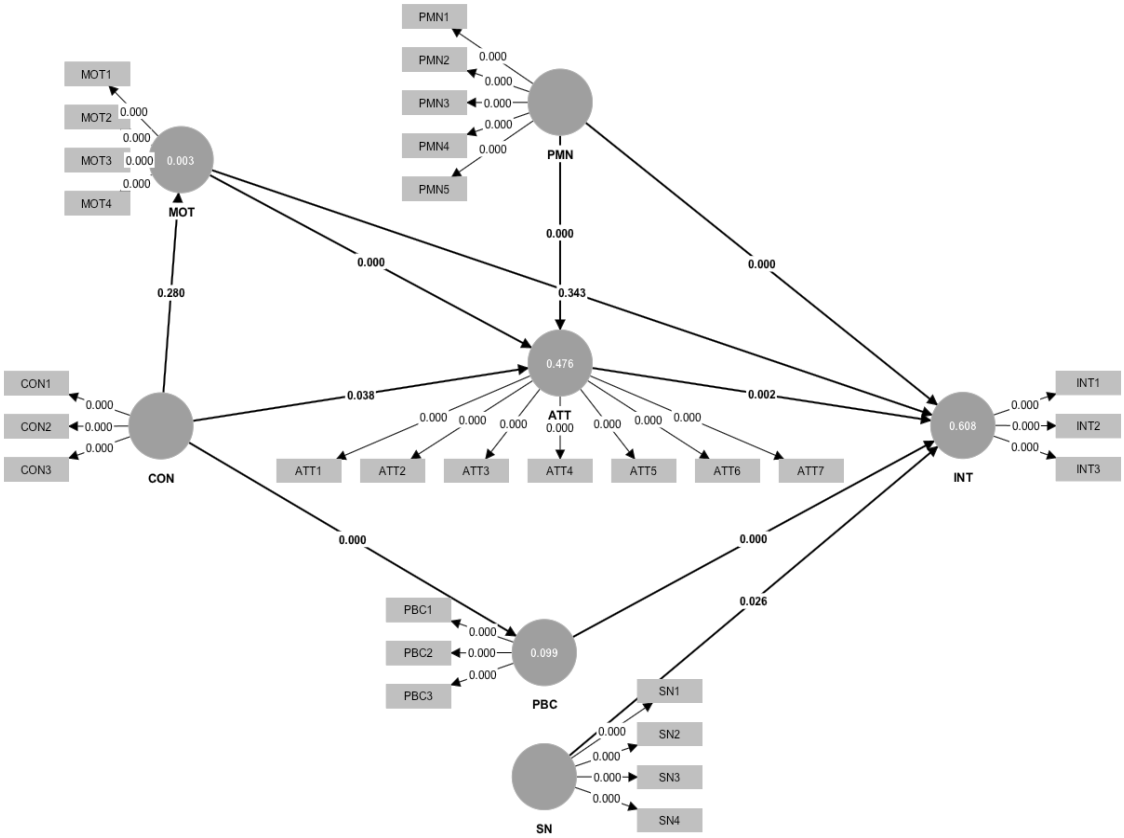

Fig 2. Structural Model (as shown in SmartPLS)

Table 5.
Hypotheses Testing Results

Hypothesis	β	SD	T	p-value	Results
H1: CON→MOT	0.055	0.094	0.584	0.280	Rejected
H2: CON→ ATT	0.086	0.048	1.775	0.038	Supported
H3: CON→PBC	0.315	0.080	3.922	0.000	Supported
H4: MOT→ ATT	0.350	0.056	6.240	0.000	Supported
H5: MOT →INT	-0.027	0.066	0.403	0.343	Rejected
H6: PMN →ATT	0.499	0.058	8.596	0.000	Supported
H7: PMN → INT	0.265	0.069	3.819	0.000	Supported
H8: ATT → INT	0.245	0.086	2.842	0.002	Supported
H9: SN → INT	0.135	0.070	1.936	0.026	Supported
H10: PBC → INT	0.381	0.062	6.188	0.000	Supported

Note. CON: Context, MOT: Motivation, ATT: Attitude, PBC: Perceived Behavioral Control, INT: Intention, PMN: Personal Moral No rm, SN: Subjective Norm; β= Path coefficient, SD= Standard deviation, T= t-statistics; *Relationships are significant at p<0.05

Consumers' PMNs are positively related to their attitudes towards using the RPS and their intention to use the RPS (H6 and H7). Hypotheses eight, nine, and ten evaluate whether consumers' attitudes towards using the RPS, their subjective norm, and their PBC positively relate to their intention to use the RPS. The results demonstrate that attitudes (β = 0.245, t= 2.842, p= 0.002), subjective norm (β = 0.135, t= 1.936, p= 0.026), and PBC (β = 0.381, t= 6.188, p< 0.001) have a significant impact on intention.

5 Conclusion

Pooling systems for reusable packaging in Germany share several characteristics, resulting in heightened competition. However, this similarity among systems suggests their strong performance and the potential for consolidation into a standardized national reuse system. Such a development could enhance user convenience and optimize the redistribution of reusable packaging.

The consumer survey conducted in this study indicates a discrepancy between the frequency of takeaway orders and the actual use of RPS, affirming the relevance of the Theory of Planned Behavior (TPB) in elucidating consumer intentions to adopt reusable packaging. Notably, Perceived Behavioral Control (PBC) emerged as the most significant predictor of consumers' intentions, followed by Perceived Moral Norms (PMN) and attitudes. Subjective norms had the least impact on these intentions.

Consumers' perceptions of their environment positively influence their attitudes toward RPS and their PBC. This underscores the necessity of fostering an environment that facilitates the use of reusable systems while simultaneously complicating the use of single-use packaging. By enhancing the availability and accessibility of RPS, we can positively affect consumer attitudes and perceived control, thereby increasing the likelihood of RPS adoption.

This study highlights the essential role of maintaining consumer motivation and fostering positive attitudes toward reusable packaging systems (RPS) to enhance intentions for their use. Additionally, the integration of Perceived Moral Norms (PMN) into the Theory of Planned Behavior (TPB) framework provides a more nuanced understanding of consumer behavior regarding RPS, demonstrating its direct influence on the formation of intentions.

Promoting the moral and environmental advantages associated with reusable packaging can effectively enhance consumer attitudes and intentions toward RPS in the German food service industry. The evidence suggests that consumers with positive attitudes are more likely to form intentions to utilize RPS, highlighting the need for strategies that reinforce these attitudes. The positive relationship between subjective norms and intentions suggests that social influences play a crucial role in shaping consumer behavior. Finally, this study contributes to the literature on reusable packaging in the German food service sector, marking the first comprehensive investigation of consumer perspectives in light of recent legislative changes. The insights gained here could inform both policy and practical measures to promote sustainable packaging practices.

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Appendix: Operationalization table

Variables	No of Survey Question	Labels	Items EN[1]	Response Scale	Adapted from
Dependent variable					
Behavioral Intention	Question 15	INT1 INT2 INT3	I will use the reusable packaging system for takeaway food in the future. I will consider using the reusable packaging system for takeaway food. I will consider switching to the reusable packaging system for takeaway food.	7-Point Likert Scale Extremely unlikely (1) to extremely likely (7)	Ertz et al., 2017
Independent variables					
Context	Question 5	CON1 CON2 CON3	I find many choices for reusable packaging systems when buying takeaway food in my surroundings. I find reusable packaging systems for takeaway food are easily available in my surroundings. I find it convenient to use reusable packaging systems for takeaway food in my environment.	7-Point Likert Scale Strongly disagree (1) to strongly agree (7)	Ertz et al., 2017
Personal Moral Norm	Question 6	PMN1 PMN2 PMN3 PMN4 PMN5	I feel I should not waste anything if it could be reused. It would be wrong of me not to use a reusable packaging system for takeaway food. I would feel guilty if I did not use a reusable packaging system for takeaway food. Not using a reusable packaging system for takeaway food goes against my principles. Everybody should share the responsibility to use a reusable packaging system for takeaway food	7-Point Likert Scale Strongly disagree (1) to strongly agree (7)	Tonglet et al., 2004
Motivation	Question 7	 MOT1 MOT2 MOT3 MOT4 MOT5	I would use the reusable packaging system for takeaway food because I think it... …helps me save money … helps me save time …is convenient … is more economical …helps to protect the environment	7-Point Likert Scale Strongly disagree (1) to strongly agree (7)	Ertz et al., 2017
Attitude	Question 8	 ATT1 ATT2 ATT3 ATT4 ATT5 ATT6 ATT7	For me, using the reusable packaging system for takeaway food is (...): Foolish/Wise Bad/Good Harmful/Beneficial Unenjoyable/Enjoyable Unpleasant/Pleasant Unfavorable/Favorable Hygienic/Unhygienic	7-Point Scale Semantic differential	Ertz et al., 2017 Tonglet et al., 2004

[1] Translated from German.

Subjective Norm	Question 9 and 11	 SN1 SN2 SN3 SN4 SN5	If I use reusable packaging for takeaway food, most people who are important to me (e.g. family and friends) would (...): Strongly disapprove/strongly approve Not appreciate it at all/Appreciate it completely Find it very undesirable/Find it very desirable Not support it at all/Strongly support it About what percentage of people who are important to you (e.g. family and friends) use a reusable packaging system for takeaway food?	7-Point Scale Semantic differential Response is scored on a 4-point scale ranging from 1 (0% to 24%) to 4 (75% to 100%)	Ertz et al., 2017 Heath and Gifford, 2002
Perceived Behavioral Control	Question 12, 13, 14	PBC1 PBC2 PBC3	How much control do you have over whether to use a reusable packaging system for takeaway food? For me using reusable packaging system for my takeaway food is: If I wanted to, I could easily use reusable packaging system whenever I buy takeaway food:	7-Point Likert Scale Little control (1) to complete control (7) Extremely difficult (1) to extremely easy (7) Extremely unlikely (1) to extremely likely (7)	Ertz et al., 2017
Demographics/ Control variables					
Place of residence	Question 1	RESID	Do you currently live in Germany?	Yes / No (End of survey)	
Frequency of takeaway food orderings	Question 2	FREQ	How often do you order takeaway food in the food service industry?	Daily, Weekly, Monthly, Rarer Never	
Past reuse behavior	Question 3 and 4	PB1 PB2	Have you ever used a reusable packaging system for your takeaway food before? How often did you use a reusable packaging system for your takeaway food in the past four months?	Yes/ No Several times a week About once a week Several times a month About once a month Rarer	Tonglet, Philips & Read, 2004
Gender	Question 16	GEN	What gender do you identify with?	Male, Female, Diverse	Fishbein & Ajzen, 2010
Education	Question 17	EDU	What is the highest degree or level of school you have completed?	Secondary or vocational school Vocational training Higher education Postgraduate studies Others	Fishbein & Ajzen, 2010
Age	Question 18	AGE	What is your age?	Number between 18 and 100	Fishbein & Ajzen, 2010