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Should My Take-Away Packaging Be Reusable? An Empirical Study Of Consumer Behaviour Towards Returnable Food Packaging In Germany

Laura Marie Breuer, Silvia Berenice Fischer, Wiltrud Terlau

International Centre for Sustainable Development (IZNE) | Hochschule Bonn-Rhein-Sieg University of Applied Sciences, Germany

E-mail: silviaberenice.fischer@h-brs.de

Abstract

Since the new German packaging law 'VerpackG2' came into force in January 2023, German foodservice operators selling food to-go are required to provide reusable packaging alternatives to their single-use plastic food packaging. 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 be successful and achieve their desired positive environmental impact, also a comprehensive understanding of consumer behaviour towards 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 foodservice industry. An online survey was developed and 153 valid responses were collected from consumers in Germany. Structural equation modelling revealed that consumers' personal moral norms, attitudes, subjective norms and perceived behavioural control directly influence consumers' intentions to use the reusable packaging system in this study. The results also show that context, motivation and personal moral norms are positively related to consumers' attitudes and that context has a significant positive effect on consumers' perceived behavioural control. Furthermore, the results of the study 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, tyre abrasion, construction and illegal dumping (IUCN 2021). The food and beverage packaging industry is a significant contributor to plastic waste, which pollutes our environment

(Kochańska et al., 2021). In 2015, the global packaging industry produced about 4,300 billion units, out of which approximately 73% accounted for food and beverage packaging (ALL4PACK, 2022). To promote sustainable packaging consumption, European waste legislation aims to foster behavioural change (Greenwood et al., 2021; WWF, 2023). Since 1994, the European Union has mandated that packaging should 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, with the goal of understanding how consumer reuse behavior can be positively influenced. Specifically, the study focuses on customers' intention to use a pooling system that provides reusable packaging for takeaway food consumption in the German food service industry.

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 & Fishbein (1980, 1991). According to TRA, a person's behavior is predominantly influenced by their behavioral intention in situations that are under their own control. The TRA includes four primary constructs: attitude towards a behavior, subjective Norm, behavioral intention, and behavior. TPB expands on this model by including an additional construct called Perceived Behavioral Control (PBC) to explain both intention and behavior. Depending on the situation and attitude, behavior, either Subjective Norm, or PBC could play a more significant role in predicting intentions that lead to behavior (Odhiambo Owino, 2019). Attitude is directly influenced by a person´s intention to behave in certain way, especially in situations under their control towards the behavior refers to 'the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question' (Ajzen, 1991). It is determined by their beliefs about the outcomes or consequences of performing the behavior and their evaluations of those outcomes or consequences (Ajzen, 1991). *Behavioral intention* is a person's subjective readiness to perform a given behavior, indicating 'how hard they are willing to try and how much effort they are planning to exert, to perform the behavior' (Ajzen, 1991). Subjective norms

refer to a person's 'perceived social pressure to perform or not to perform the behavior' (Ajzen, 1991). It is determined by their beliefs about the expectations and opinions of significant others, such as friends, family, and colleagues, as well as the motivation to comply with those expectations and opinions. PBC is generally defined as 'a person's belief regarding how easy or difficult it is to perform a certain behavior (Ajzen & 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 asserts that the higher the PBC and the greater the person's motivation, the more likely they are to perform the behaviour (Ajzen, 1991). Moral norms are values that are socially determined, validated, and attached to a particular behavior (Conner & Armitage, 1998). Personal norms are internalized values that reflect an individual's moral obligations (Schwartz, 1977). Studies have shown that when the construct of the moral norm is added to the TPB framework, it increases the predictability of Pro-Environmental Behavior (PEB) (Jackson, 2005). PEB is behavior that minimizes harm to the environment or even benefits it (Steg & Vlek, 2009). In this study, using RPS is considered one form of PEB. Behavioral intentions refer to a person's readiness to perform a given behavior and are considered the immediate antecedent of behavior' (Ajzen, 2002). Motivations, or motives, are internal or external factors that drive an individual to behave in a particular way or to take a specific action (Kothe et al., 2019). 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, also known as situational factors, are environmental or external influences that impact the execution of a behavior by either facilitating or constraining it (Steg & Vlek, 2009). These factors can include various skills, opportunities, or resources needed to perform a behavior, such as the physical infrastructure, technical facilities, or the availability of specific products (Jackson, 2005; Steg & Vlek, 2009). Next 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 & Vlek, 2009).

2.2. Conceptual model and hypotheses

According to the TPB proposed by Ajzen (1991), attitudes, subjective norms, and PBC have a direct impact on 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 instead focuses on measuring behavioral intentions as a critical predictor of PEB, which in this case is consumers' intention to use a RPS. This research further expands the TPB by adding other variables such as context, motivation, and PMN into the model (Figure 1).

Based in the literature review and the proposed model, the following hypothesis are proposed:

Context

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

H2: Consumers' perception about the context is positively related to consumers’ attitudes towards the use of the reusable packaging system.

H3: Consumers' perception about 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.

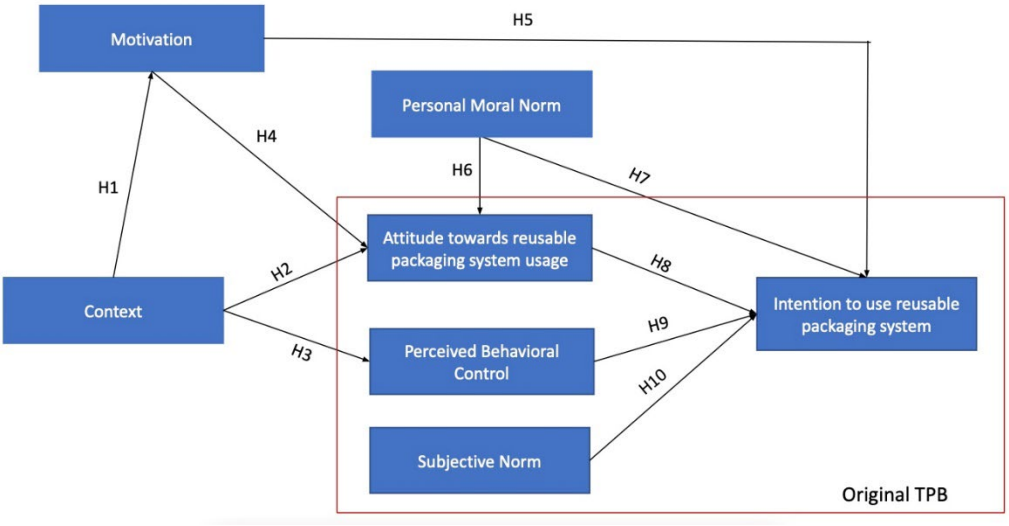

Fig. 1. Conceptual model. From: Own source

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 is 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's 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. A pilot study with 10 participants was conducted to identify any comprehension issues and ensure adequate wording (Malhotra et al., 2017). The survey was carried out in German language. A total of 178 responses were collected, out of which 153 were selected for further analysis Table 1 shows the respondents profile.

Table 1. Respondents profile.

Demographics	Count	%
Gender		
Female	85	55,6
Male	65	42,5
Diverse	3	2
Education		
Weiterführende Schule or Berufsschule	13	8,5
Berufsausbildung	28	18,3
Hochschulstudium	98	64,1
Aufbaustudium	10	6,5
Others	4	2,6
Total	153	100

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

The questionnaire targeted take-away consumers living in Germany and was distributed online via several social media platforms such as Instagram, Facebook, and LinkedIn. In addition, various mail distribution lists in the work and study context were also used. The ordering take-away behaviour was surveyed by indicating the frequency of ordering and the previous experience using RPS. Furthermore, Likert scales were used to measure the primary constructs of TPB (intention to use a RPS, attitude towards RPS, subjective norm and PBC). In addition, contextual factors, PMN, and motivation, were also evaluated (Table 2). The construct of behavioral intention was measured using a scale adapted from Ertz et al. (2017), who investigated the consumption of different reusable containers using the TPB. The items to measure construct of PMN were adapted from Tonglet et al. (2004). Motivation construct was measured by asking participants the reasons to use RPSs (savings, financial, to help protect the environment). On the other hand attitudes were measured by identifying factors influencing usage.

The subjective norm construct consists of two concepts, namely injunctive and descriptive norm. The injunctive norm was measured with four items adapted from Ertz et al. (2017) on a semantic differential scale. Descriptive norm was measured by asking respondents to estimate the percentage of people important to them (e.g., family and friends) using a RPS for takeaway food (items adapted from Heath and Gifford (2002). The construct of PBC was measured using three items adapted from Ertz et al. (2017). At the end of the survey, respondents were asked to provide socio-demographic information (gender, age, and the highest level of education were queried, as previous research confirmed that these demographics are linked to sustainable consumption behaviors and predictors of PEB (de Leeuw et al., 2015; Odhiambo Owino, 2019; White et al., 2019).

3.2 Data Analysis

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

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 internal reliability of the measurement scales was confirmed through an assessment of the composite reliability, as outlined by Henseler et al. (2009). The results, presented in Table 3, indicate that all seven constructs, namely context, motivation, PMN, attitude, subjective norm, PBC, and intention, showed CR values above the cut-off value of 0.7. This indicates that the measurement model is reliable.

Convergence validity was assessed using the average variance extracted (AVE). The AVE values of the constructs, namely context, PMN, attitude, subjective norm, PBC, and intention, were all higher than the desired value of 0.5. This indicates that the model fits well. The AVE values were 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.

Table 4. Operationalization table.

Variables	No of Survey Question	Labels	Items EN	Items DE	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.	Ich werde in Zukunft das Mehrwegverpackungssystem für Essen zum Mitnehmen nutzen. Ich werde in Betracht ziehen, das Mehrwegverpackungs-system für Essen zum Mitnehmen zu nutzen. Ich werde in Erwägung ziehen, beim Kauf von Essen zum Mitnehmen auf die Nutzung des Mehrwegverpackungssystems umzusteigen.	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.	In meiner Umgebung gibt es ein großes Angebot an Mehrwegverpackungssystemen, wenn ich Essen zum Mitnehmen kaufe. In meiner Umgebung sind Mehrwegverpackungssysteme beim Kauf von Essen zum Mitnehmen leicht erhältlich. Ich kann in meiner Umgebung bequem Mehrwegverpackungssysteme für Essen zum Mitnehmen nutzen.	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	Ich sollte nichts wegwerfen, was wiederverwendet werden kann. Es wäre falsch von mir, kein Mehrwegverpackungssystem für Essen zum Mitnehmen zu nutzen. Ich hätte ein schlechtes Gewissen, wenn ich kein Mehrwegverpackungssystem für Essen zum Mitnehmen nutzen würde. Der Verzicht auf die Nutzung des Mehrwegverpackungs-systems für Essen zum Mitnehmen verstößt gegen meine Prinzipien. Jeder sollte die Verantwortung für die Nutzung des Mehrwegverpackungssystems für Essen zum Mitnehmen mittragen.	7-Point Likert Scale Strongly disagree (1) to strongly agree (7)	Tonglet et al., 2004
Motivation	Question 7	MOT1 MOT2	I would use the reusable packaging system for takeaway food because I think it... …helps me save money	Ich würde das beschriebene Mehrwegverpackungssystem für Essen zum Mitnehmen nutzen, weil ich denke, dass… …ich dadurch Geld sparen kann	7-Point Likert Scale Strongly disagree (1) to strongly agree (7)	Ertz et al., 2017

		MOT3 MOT4 MOT5	… helps me save time …is convenient … is more economical …helps to protect the environment	…ich dadurch Zeit spare … es praktisch ist …es wirtschaftlicher ist …es die Umwelt schont		
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	Für mich ist die Nutzung des Mehrwegverpackungssystems für Essen zum Mitnehmen(...): Unvernünftig/ Vernünftig Schlecht/Gut Unnütz/Nützlich Unangenehm/ Angenehm Unattraktiv/Attraktiv Unvorteilhaft/Vorteilhaft Unhygienisch/ Hygienisch	7-Point Scale Semantic differential	Ertz et al., 2017 Tonglet et al., 2004
Subjective Norm	Question9 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?	Wenn ich das Mehrwegverpackungssystem für Essen nutze, würden die meisten Menschen, die mir wichtig sind (z. B. Familie und Freunde) dies (...): Stark ablehnen/stark befürworten Überhaupt nicht zu schätzen wissen/Sehr zu schätzen wissen Sehr verwerflich finden/Sehr erstrebenswert finden Überhaupt nicht unterstützen/Sehr stark unterstützen Wie viel Prozent der Menschen, die Ihnen wichtig sind (z.B. Familie und Freunde) nutzen ein Mehrwegverpackungssystem für Essen zum Mitnehmen?	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:	Wie sehr liegt es in Ihrer Kontrolle, ob Sie das Mehrwegverpackungssystem für Essen zum Mitnehmen nutzen? Die Nutzung des Mehrwegverpackungssystems für Essen zum Mitnehmen wäre für mich: Wenn ich wollte, könnte ich das Mehrwegverpackungssystem mühelos nutzen, wenn ich Essen zum Mitnehmen kaufe:	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?	Wohnen Sie aktuell in Deutschland?	Yes / No (End of survey)	
Frequency of takeaway	Question 2	FREQ	How often do you order takeaway food in the food service industry?	Wie häufig bestellen Sie Essen zum Mitnehmen in der Gastronomie?	Daily Weekly Monthly	

food orderings					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?	Haben Sie schon einmal ein Mehrwegverpackungssystem für Essen zum Mitnehmen genutzt? Wie oft haben Sie in den letzten vier Monaten ein Mehrwegverpackungssystem für Essen zum Mitnehmen genutzt?	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?	Mit welchem Geschlecht identifizieren Sie sich?	Male Female Diverse	Fishbein & Ajzen, 2010
Education	Question 17	EDU	What is the highest degree or level of school you have completed?	Was ist Ihr höchster Bildungsabschluss?	Weiterführende Schule or Berufsschule Berufsausbildung Hochschulstudium Aufbaustudium Others	Fishbein & Ajzen, 2010
Age	Question 18	AGE	What is your age?	Wie alt sind Sie?	Number between 18 and 100	Fishbein & Ajzen, 2010

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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 construct of attitude 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 successful 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 about the context is positively related to their attitudes towards the use of 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 has a significant and positive impact on attitude (β = 0.350, t= 6.240, p< 0.001).

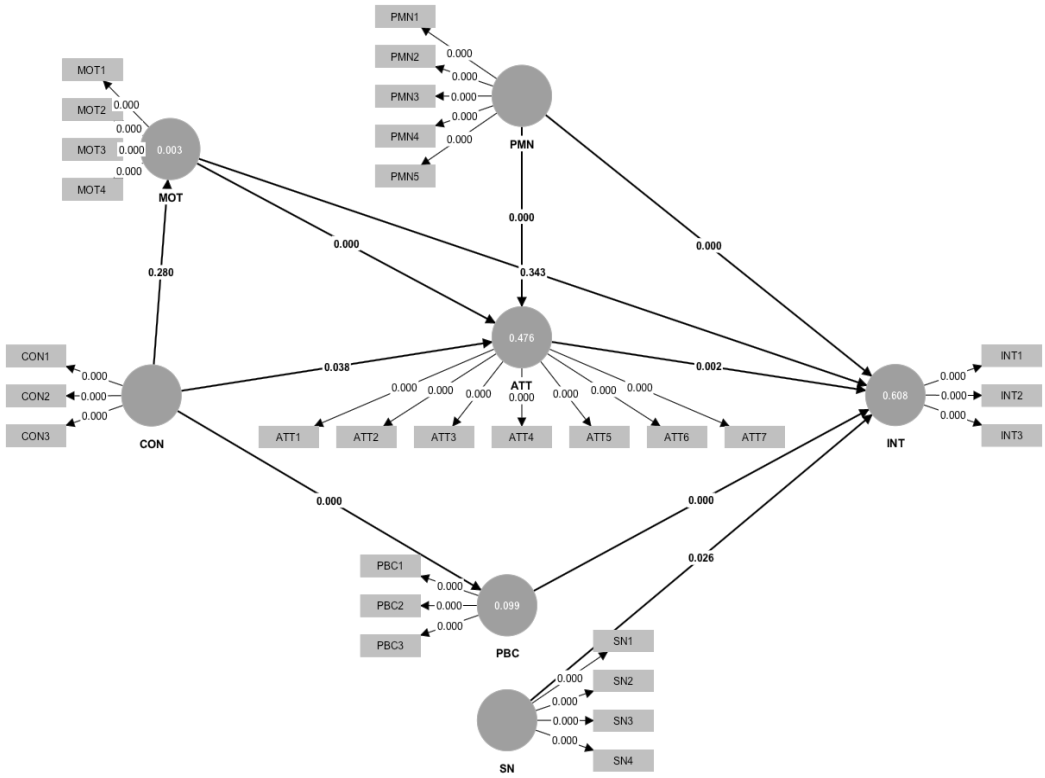

Fig 2. Structural Model (as shown in SmartPLS)

Furthermore, consumers' PMNs are positively related to their attitudes towards the use of 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 are positively related 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.

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 Norm, SN: Subjective Norm

β= Path coefficient, SD= Standard deviation, T= t-statistics

*Relationships are significant at p<0.05

5 Conclusion

Previous studies did not focus on the consumer's role in choosing reusable packaging in the German food service industry, especially after introducing the new packaging law. Therefore, this research aims to fill this gap and provide valuable insights.

After analyzing the current status and characteristics of pooling systems that offer reusable packaging for takeaway food in the German food service industry, it has been found that the leading pooling systems for reusable takeaway food packaging in the German market share similar characteristics. This has resulted in a high intensity of competition in the German market. However, the similarities between these systems also suggest that these pooling systems with such characteristics currently perform exceptionally well in the German food service industry. Moreover, these similar pooling systems have the potential to be merged into one standardized national reuse system for reusable food packaging. This can enhance user convenience and enable better redistribution of the reusable packaging within the system.

The consumer survey results in Germany showed that despite frequent takeaway food orders, consumers' use of RPS for takeaway food needs to increase. Consistent with other research in the domain of pro-environmental consumer behavior (Ertz et al., 2017; Khan et al., 2019; Klöckner, 2013; Nigbur et al., 2010; Staats et al., 2003; Steg & Vlek, 2009; L. Zhang et al., 2019), the results of this study verify that the original TPB is an appropriate model for explaining consumers' intentions to use a RPS for their takeaway food.

In this study, PBC has the most substantial direct and positive impact on consumers' intentions, which is in line with the literature (Botetzagias et al., 2015; de Leeuw et al., 2015; Ertz et al., 2017), followed by PMN and attitudes, whereas subjective norm has the least strong influence on consumers' intention to use the RPS under study.

Results confirmed that consumers' perception of the context is positively related to consumers' attitudes towards the use of the RPS and consumers' PBC. This discovery underpins the importance of considering consumers' understanding of factors in their surroundings that can either encourage or hinder using an RPS, as highlighted by Long et al. (2022). Accordingly, it can be suggested to improve the availability and accessibility of RPS in the surroundings of the consumers in order to positively influence their attitudes towards the RPS and their PBC, which can, in turn, positively affect consumers' intention to use the RPS.

The results of this study further highlight the importance of establishing environmental conditions that facilitate consumers' use of RPSs and simultaneously complicate the use of single-use packaging. By doing this, the convenience factor associated with using the RPS can be enhanced, positively influencing consumers' attitudes, PBC, and, thereby, inclination to utilize the RPS. Consumers' motivation to use an RPS has a positive impact on consumers' attitudes towards the RPS, which aligns with Ertz et al.'s (2017) research results. As attitudes directly influence consumers' intention to use an RPS, this finding suggests keeping consumers' motivation to use the RPS high and, thereby, consumers' attitudes towards the RPS positive when aiming to enhance consumers' intention to use an RPS.

Beyond that, this study confirmed that by extending the TPB with the variable of PMN, an additional contribution to the explanation of consumers' intention to use an RPS can be made, as results prove that PMN has a direct positive impact on consumers' intention to use the RPS under study. This study

substantially contributes to the research field by including PMN as an additional variable in the TPB framework, thereby adding a new perspective to understanding the factors influencing consumers' intention to use an RPS.

Hence, the findings of this study illustrate the potential to positively influence consumers' attitudes towards the RPS and thereby boost consumers' intention to use the RPS for their takeaway food by emphasizing the moral values and environmental benefits attached to the reuse behavior under study.

Next, this study confirmed that consumers' attitudes towards using the RPS directly influence consumers' intention to use the RPS. This implies that consumers with more positive attitudes towards using RPSs are more likely to form intentions to perform that behavior. Therefore, it is essential to ensure that consumers' attitudes towards the RPS become or remain positive by, for example, pointing out the system's benefits. This finding is in line with previous research performed in different research settings in the environmental domain, which validates the influence of attitudes on behavioral intentions (Boldero, 1995; Ertz et al., 2017; Heath & Gifford, 2002; Jackson, 2005; Tonglet et al., 2004). The results of this study also confirmed a reasonable predictive relevance for attitude, with 47.6% of change being accounted for by context, motivation, and PMN. Hence, it is recommended to focus mainly on positively influencing these variables to enhance consumers' attitudes toward the RPS under study.

Moreover, the present research demonstrated that consumers' subjective norm is positively related to consumers' intention to use the RPS under study. This finding indicates that consumers who perceive that essential others want them to use or are already using an RPS for their takeaway food are more likely to develop intentions to execute that behavior. According to Fishbein and Ajzen (2010), the components of descriptive and injunctive norms form subjective norms, which affect consumers' behavioral intentions. Other studies have already investigated the influence of descriptive norms on consumer behavior as part of the TPB framework (Rivis & Sheeran, 2003), including studies on different PEBs that found a significant relationship between the constructs (Heath & Gifford, 2002; Nigbur et al., 2010; Onwezen et al., 2014). Some studies revealed that descriptive norms significantly affect behavior more than injunctive norms (Conner et al., 1996; Conner & McMillan, 1999; Heath & Gifford, 2002; Melnyk et al., 2019). Finally, the findings revealed that consumers' PBC directly impacts consumers' intention to use the RPS. This indicates that consumers who perceive that they have a high degree of control over their behavior, which is reflected by their access to and ownership of necessary resources like skills and time to be able to use the RPS, are more likely to form intentions to use an RPS for their takeaway food. This finding is in line with recent studies that applied the TPB model to investigate pro-environmental consumer behavior and identified PBC as a powerful and often the strongest predictor of behavioral intentions (Botetzagias et al., 2015; de Leeuw et al., 2015; Ertz et al., 2017; Terlau & Hirsch, 2015). Finally, this study provides a valuable contribution to the current state of research as it is the first study to investigate the consumer perspective on reusable packaging for takeaway food in the German food service industry after the introduction of the new German packaging law in January 2023.

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