Org. Agr.
https://doi.org/10.1007/s13165-023-00442-5

Eco-packaging in organic foods: rational decisions or emotional influences?

Alessia Lombardi · Giovanbattista Califano · Francesco Caracciolo · Teresa Del Giudice · Luigi Cembalo

Received: 26 June 2023 / Accepted: 7 September 2023

Abstract The introduction of biodegradable and compostable packaging has been a significant milestone in reducing conventional plastic use, particularly in sectors that prioritize sustainability like the organic food industry. This study explores the factors influencing the selection of such packaging, with a specific focus on the role of emotions in a representative sample of Italian consumers. Two models, the Theory of Planned Behavior (TPB) and the Rational-Emotional Model (REM), were evaluated and compared. The TPB model confirms that positive attitudes, subjective norms, and perceived behavioral control influence the intention to choose biodegradable and compostable packaging. The REM reveals that environmental concern, cognitive benefits, and emotions significantly impact purchase intentions. The REM explains a greater variance in intention compared to the TPB model, highlighting the importance of combining rational and emotional components. Biodegradable and compostable packaging aligns well with the target consumers of organic food, making it an excellent solution for organic produce. Emotions play a crucial role in shaping consumer intentions and behaviors. Marketing strategies should appeal to consumers' emotional responses, address cognitive concerns, and highlight the specific benefits of sustainable packaging. This research emphasizes the relevance of bioplastic packaging for organic products and underscores the significance of emotions in influencing consumer behavior.

Keywords Biodegradable packaging · Compostable packaging · Fourth range · Italian consumers

Introduction

In recent times, the alarming data on global pollution and resource depletion have captured significant attention, making social and environmental responsibility a fundamental concern in consumers' everyday consumption behavior (Jose et al. 2022; Sánchez-Bravo et al. 2020; Prakash and Pathak 2017). Consumers are strongly motivated to do their part in protecting the environment by encouraging the practice of "green consumption" (or alternatively called "eco-friendly" or "sustainable" consumption) (Chaihanchanchai and Anantachart 2023; Yao et al. 2022; Moser 2015; Prakash and Pathak 2017).

The "green consumption" pattern is characterized by pro-environmental behaviors, wherein consumers actively focus on protecting the ecological environment during the entire life cycle of products—from purchase to use and disposal (Borrello et al. 2020; Raimondo et al. 2022). The goal is to minimize individual actions that could have a detrimental impact on the environment (Carlson and Kangun 1993).

A. Lombardi · G. Califano (✉) · F. Caracciolo · T. Del Giudice · L. Cembalo
Department of Agricultural Sciences, University of Naples Federico II, Naples, Italy
e-mail: giovanbattista.califano@unina.it

Published online: 27 September 2023

These environmentally conscious consumers form the foundation of the growing "sustainable movement," which advocates for green and eco-friendly choices while aiming to reduce the adverse effects of consumption and the generation of solid waste (Asif et al. 2023; Ramayah et al. 2010). As a result, the emergence of new segments of green consumers has contributed to the promotion of more sustainable practices and behaviors, encouraging a shift toward a greener and more environmentally responsible society (Lerro et al. 2018).

Up to one-third of environmental impact is attributed to the use of food packaging materials (Herbes et al. 2018; Koenig-Lewis et al. 2014). Since the late twentieth century, plastic packaging was introduced and quickly dominated the market due to its desirable properties, including transparency, flexibility, durability, and convenience (Mitrano and Wagner 2022). However, despite its relevance in the food system, plastic packaging represents the primary contributor to the global environmental debt, and pollution associated with its use has become even harder to overcome (Michaliszyn-Gabryś et al. 2022; Mitrano and Wagner 2022; Walker 2021).

The need to rethink the use of plastics is the focus of policy makers and organizations, which are constantly carrying out actions aiming to minimize the use of plastic packaging (Walker 2021). In this vein, the launch of eco-innovative bio-based plastic packaging[1], in particular biodegradable and compostable packaging, has been a key step (Morinval and Averous 2022). The success of bioplastic packaging could represent a turning point especially for sectors that best represent sustainable consumers and the "green" movement, such as the organic food sector (Bazaluk et al. 2020).

The organic sector has experienced a remarkable growth in the food industry over the past few years (Rana and Paul 2017). Health consciousness, environmental concern, and sustainability issues are the main factors that motivate consumers to choose organic food products (Pallathadka et al. 2022; Pearson et al. 2011; Hughner et al. 2007; Zanoli and Naspetti 2002). Eco innovation derived from the development and the diffusion of bioplastics represents a key element for the success of the organic food sector for several reasons. To illustrate, with the rise of consumers' environmental awareness, alternative materials to plastic are in high demand for packaging organic food products. Organic producers are looking for such innovative solutions and, among them, the zero-waste solution, which avoids using plastics for packaging production, is the best one (Bazaluk et al. 2020).

However, to realize the success of bioplastics, it is necessary that consumers express their willingness to opt for such alternatives on the market (Ketelsen et al. 2020; Hermann et al. 2022; Steenis et al. 2018). Given the great potentiality of the bioplastic packaging sector, what is worth considering is the understanding of the factors that play a role in consumers' choice of biodegradable and compostable packaging.

Previous studies have examined consumers' perceptions and willingness to pay for alternative packaging, revealing a general resistance to changing consumption behavior but also an increasing willingness among consumers to pay for sustainable packaging. However, there remains a lack of clarity regarding how consumers perceive sustainable packaging and which strategies can effectively develop an impactful packaging strategy. Several authors (Findrik and Meixner 2023; Norton et al. 2022; Nguyen et al. 2020) have identified barriers and drivers for purchasing bioplastic packaging, encompassing product characteristics and consumers' psychological factors. Notably, emotional responses of consumers hold promise as crucial elements in bridging knowledge gaps and facilitating sustainable behavioral change (Giannoutsos et al. 2023).

Models grounded in social and behavioral psychology are based on the theory that consumer behavior is influenced by cognitive aspects, specifically the relationship between attitudes and behaviors (Ajzen 1991; Carvajal et al. 2004; Diamantopoulos et al. 2003; Walker 2021; Sharma and Foropon 2019). To illustrate, the Theory of Planned Behavior (TPB; Ajzen 1991) has been the cornerstone in many scientific studies in the context of sustainable choices (Frommeyer et al. 2022; Gallagher et al. 2022): its constitutive components, namely Subjective Norms, Perceived Behavioral Control, and Attitude, have proved to be the antecedents in predicting intentions to choose sustainable packaging (Prakash and Pathak 2017; Limbu et al. 2012; Cammarelle et al. 2021).

However, another body of literature has highlighted the significance of the emotional aspect in shaping

[1] Bioplastics derive wholly or in part from renewable biomass sources; biodegradable and compostable plastics (as a subgroup of bioplastics) are defined "as single polymer which degrade 60% within 180 days and multipolymers which degrade 90% within 180 days" (Dharmadhikari 2012).

consumers' intention to purchase sustainable packaging (Koenig-Lewis et al. 2014). This theory challenges the rational choice models, like TPB, which assume that individuals always behave rationally and are unaffected by emotional factors (Sparks and Shepherd 2002; Manstead 2000). Although rational choice models have dominated the scientific literature devoted to ecological purchases, in predicting behaviors with an affective, rather than, just logical component, TPB seems to perform less efficiently (Koenig-Lewis et al. 2014; Godin and Kok 1996). Put differently, emotional components seem to perform better in explaining pro-environmental behaviors, such as the choice of sustainable packaging (Meneses 2010; Carrus et al. 2008; Fraj and Martinez 2006).

In this vein, previous literature has raised the necessity to better analyze how and how much emotions affect pro-environmental buying behavior (Harth et al. 2013; Hartmann and Apaolaza-Ibáñez 2008). A study conducted by Koenig-Lewis et al. (2014) has already incorporated emotional components, such as positive and negative emotions, in the evaluation of behavioral intention to purchase ecologically responsible packaging. In detail, in this model, rational variables, such as environmental concern and consumers' cognitive benefits related to ecologically responsible consumption, are modeled together with emotions to predict and explain behavioral intentions (from this point forward, this model will be called Rational-Emotional Model; REM). But which model, among the two described above, better explains consumer's intention to choose bioplastic packaging? The current paper attempts to take a step forward in this field, with an analysis of factors that influence consumers' choice of biodegradable and compostable packaging making, for the first time, a direct comparison between both models, i.e., TPB and REM (just as used by Koenig-Lewis et al. 2014), using a representative sample of Italian consumers.

Therefore, we aim to contribute to this issue by answering to the following question: *Which of the two models demonstrates stronger predictive power in the context of sustainable packaging choices?* (RQ1).

Moreover, since previous studies suggested that incorporating emotional components into TPB enhances the model's power (Ajzen 2011; Rivis et al. 2009), *does the addition of emotional components to models with classical rational components enhance their predictive power?* (RQ2).

To summarize, the present research will allow us to (i) evaluate and measure the relationship of constitutive determinants of TPB (Subjective Norms, Perceived Behavioral Control, and Attitude) in predicting consumers' intention to purchase food in biodegradable and compostable packaging; (ii) evaluate and measure the role of emotional components in REM in predicting the intention to choose biodegradable and compostable packaging; and (iii) compare the power of both models singularly implemented. Finally (iv), since previous studies suggest that the incorporation of emotional components into TPB increases its predictive power (Ajzen 2011; Rivis et al. 2009), we will insert the REM's emotional constructs (positive and negative emotions) into an extended TPB model to test its efficacy.

The reminder of this paper is as follow. The next section provides an explanation of the conceptual framework and detailed models' specification. The third section illustrates the methodology with questionnaire and statistical analysis of data. In the fourth section, results of the models are presented. In the last sections, discussion and conclusions are drawn.

Theoretical frameworks

The Theory of Planned Behavior

According to the TPB, human action is determined by three main beliefs: behavioral beliefs (the evaluation of behavior's outcome); normative beliefs (normative expectation of others and relative motivation); and control beliefs (credence about factors which can facilitate or make difficult the behavior) (Ajzen 1991). In the aggregate model of TPB, behavioral beliefs bring to the formation of *attitude toward the behavior*; normative beliefs shape the *subjective norms*; and the control beliefs determine the *perceived behavioral control*. To illustrate, attitude toward a behavior is deduced by the complete evaluation of the behavior in question; subjective norms are defined as the perceived social pressures about the behavior and derived by the others' beliefs; perceived behavioral control is defined as the individuals' conviction about the capabilities to perform the behavior under investigation (Ajzen 1991; Wang et al. 2021). Attitude toward the behavior, subjective norm, and perceived behavioral control lead to the formation of *behavioral intentions* (defined as the main predictor of actual human behavior). In other words, the more favorable the attitudes and subjective norms, and the greater the perceived

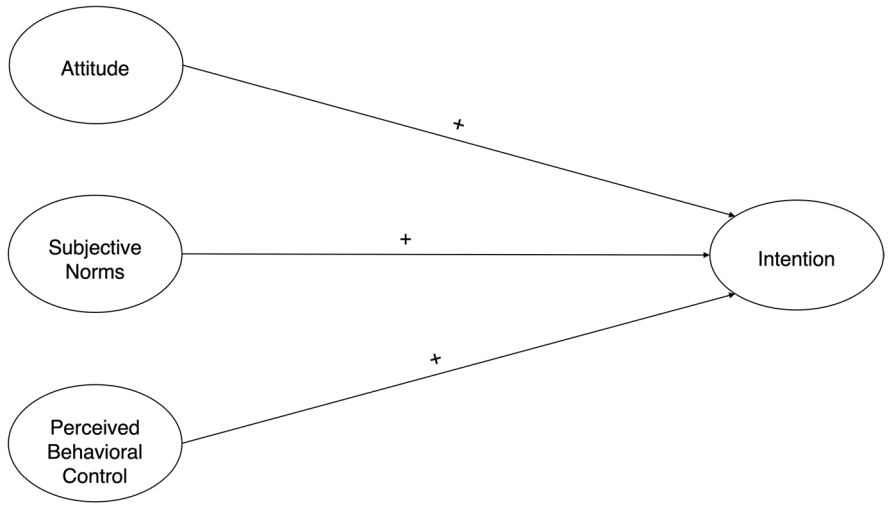

Fig. 1 Schematic representation of TPB model relations (adapted from Ajzen 1991)

behavioral control, the stronger should be the individual intention to perform the specific behavior (Ajzen 1991) (Fig. 1).

In this paper, the predictive power of the TPB on the intention to buy food products in biodegradable and compostable packaging has been tested and compared to the estimates provided by the REM described in the following subsection.

The Rational-Emotional Model

The REM emerged from a critique to rational choice models, such as TPB, in which emotive responses are not explicitly represented (Sparks and Shepherd 2002): TPB model does not seem to be as effective in predicting behaviors with a strong affective and emotional component, such as pro-environmental behaviors (Sparks and Shepherd 2002; Carrus et al. 2008). Incorporating emotion into evaluation of pro-environmental behaviors increases the predictive power of the model (Sandberg and Conner 2008). In 2014, Koenig-Lewis and colleagues have modeled together two rational variables such as general concern about the environment and consumers' cognitive benefits related to pro-environmental behaviors, with emotions, such as positive and negative emotions related to the choice of ecologically responsible packaging. Each rational and emotional component is described as follows: environmental concern is defined as the individuals' awareness toward environmental problems and the consequent willingness to contribute to their solution. Previous literature has legitimized environmental concern as one of the key factors in explaining environmentally friendly behaviors (Duong et al. 2022; Prakash and Pathak 2017; Suki 2016; Albayrak et al. 2013). Cognitive benefits are defined as the individual evaluation of the benefits which derivate by consuming ecologically responsible products (Koenig-Lewis et al. 2014). Finally, emotions are more complex to define. Oatley et al. (2006) defined them as the "primary idiom for defining and negotiating social relations of the self in a moral order" (cited in Oatley et al. 2006, p. 28). In other words, in the context of the present study, emotions can be defined as "the push" to perform or not a specific behavior (Frijda and Mesquita 1994). Emotions, influenced by individuals' cognitive processes, typically have a limited duration and can be categorized as either positive or negative. Finally, individuals' feelings of positive and negative emotions are influenced by cognitive evaluations derived by experiences (Lazarus 1991).

While emotional components appear to have a significant role in explaining certain behaviors, it is essential to acknowledge that the REM is not widely utilized and has only been tested in a specific cultural context characterized by a high level of environmental awareness (Koenig-Lewis et al. 2014). On the other hand, the TPB is much more versatile and popular. Therefore, following the same conceptual framework as Koenig-Lewis et al.'s (2014) research, we examined the predictive power of the REM concerning the intention to purchase food products in biodegradable and compostable packaging within the Italian context. The conceptual model of REM and its hypothesized relations are presented in Fig. 2.

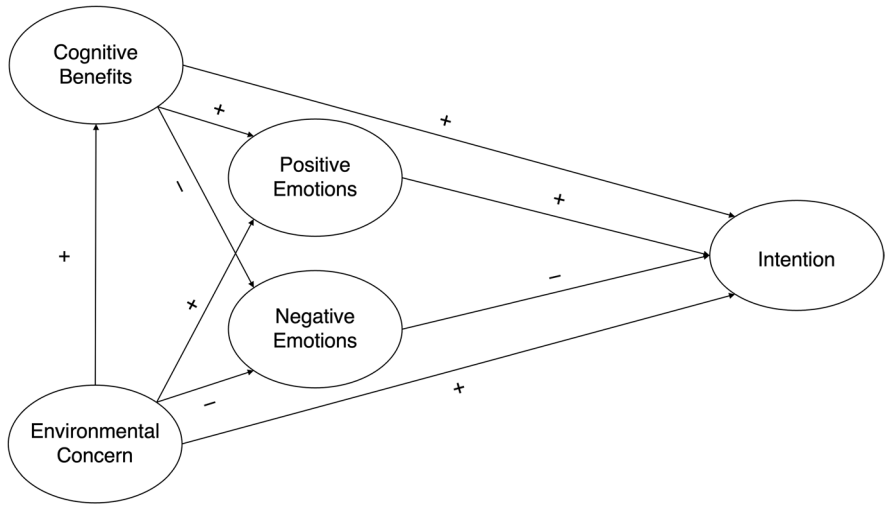

Fig. 2 Schematic representation of REM relations (adapted from Koenig-Lewis et al. 2014)

The extended TPB

In the context of the TPB, emotions are often assumed to play an implicit role in influencing the three types of beliefs that shape behavioral intentions: behavioral, normative, and control beliefs (Ajzen 2011). However, previous studies suggest that the explicit incorporation of emotional components into the TPB model increases its predictive power and explanatory ability. For example, in a meta-analysis of 24 datasets from different domains, Sandberg and Conner (2008) found that adding anticipated affects to the TPB resulted in an additional 7% of variance explained in intentions, and an additional 1% of variance explained in behavior.

No studies have explored our specific extension of TPB, which integrates both positive and negative emotions as formulated in the REM model. However, most of the previous TPB extensions that aimed at exploring the role of emotions specified such emotions exclusively as direct antecedents of intentions (and behavior, when measured), without any direct links to the antecedents of intentions (e.g., Caso et al. 2022; Kim et al. 2013; Moons and De Pelsmacker 2012). This is because the antecedents of intentions, such as attitudes, subjective norms, and perceived behavioral control, are assumed to be "silently" influenced by emotions (Ajzen 2011).

Therefore, we tested the integration of TPB with emotional components from REM by adding positive and negative emotions to the intention equation. The conceptual model of the extended TPB and its hypothesized relations are presented in Fig. 3.

Methodology

Questionnaire and sample

Data were collected through interviews with a statistically representative sample of Italian households. The data collection took place during the Fall of 2022 and was conducted by a professional marketing research agency using a tailored questionnaire designed specifically for this study. The sampling method employed in the field protocol was quota sampling.

In more detail, the research agency utilized quota sampling to ensure that the selected respondents were a fair representation of the target population. In this case, the respondents responsible for household purchasing were selected, and they were screened based on age, limited to the range of 18 to 75 years, and their place of residence, categorized into four regions: Northwest, Northeast, Center, and South of Italy.

The demographic proportions used in the sampling process were based on the data provided by the Italian National Institute of Statistics (ISTAT) regarding the resident population in each region. This approach allowed us to obtain a sample that reflected the diversity of the Italian population. Ultimately, the final sample consisted of 856 respondents who participated in the survey.

Before proceeding to answer the questionnaire, the participants were informed about the anonymity of data collection and were required to sign an informed consent form. The questionnaire consisted of three main sections, and each question or item required a mandatory answer to avoid missing values.

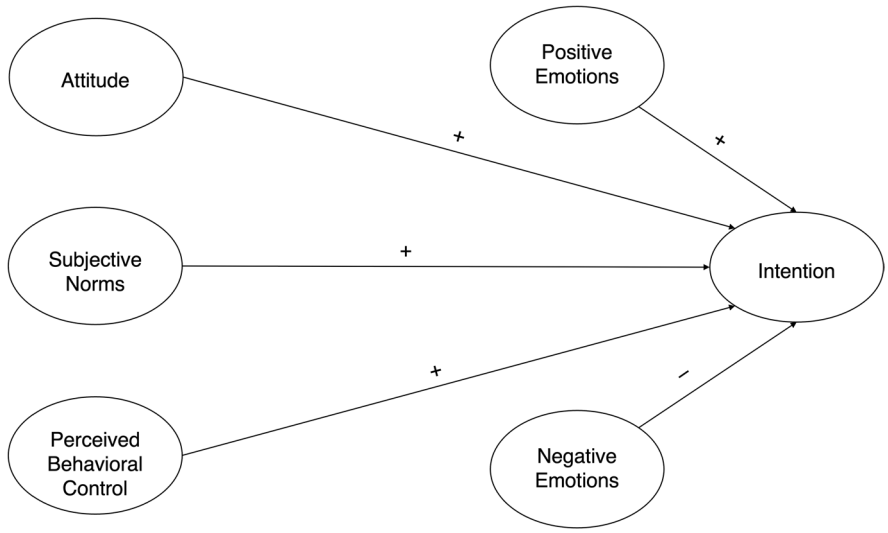

Fig. 3 Schematic representation of the extended TPB relations

Section 1 focused on participants' food purchasing habits, such as the type of store where they usually purchase food, the frequency of fruit and vegetable consumption, and the frequency of purchasing fourth range products.

In Section 2, the participants completed psychographic measures, with items for the TPB constructs (i.e., intention, attitude, subjective norms, and perceived behavioral control) expressed according to the TACT principle (Target, Action, Context, and Time; Fishbein and Ajzen 2011). Except for attitude, all constructs were assessed using three items on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). Attitude toward purchasing food in biodegradable and compostable packaging was evaluated using three items on a 5-point semantic differential scale (Osgood 1964). All constructs of the REM were adapted from Koenig-Lewis et al. (2014): environmental concern (3 items), cognitive benefits (6 items), and positive/negative emotions related to purchasing food in biodegradable and compostable packaging (5 and 2 items, respectively). Participants rated each item on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). All items used in Section 2 are presented in the Appendix (Table 6 and Table 7).

Finally, Section 3 collected the respondents' sociodemographic characteristics, such as age, gender, and income. Table 1 presents the main descriptive statistics for our sample.

Statistical analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to estimate the three models under study, namely, the TPB, the REM, and the TPB extended with emotional components. PLS-SEM is a widely used statistical method for examining complex relationships between latent variables, which makes it well-suited for predictive purposes (Hair et al. 2011). Although PLS-SEM and Structural Equation Modeling (SEM) estimates are generally similar, PLS-SEM is preferred for predictive studies due to its objective of maximizing the explained variance of endogenous/dependent variables (Hair et al. 2011).

Like traditional SEM, the PLS-SEM consists of a measurement model that estimates the relationships between latent variables and their indicators, and a structural model that estimates the relationships among latent constructs (Venturini and Mehmetoglu 2019). The measurement model was confirmed by assessing indicator reliability, convergent validity, and discriminant validity, while the structural model assessment was based on path coefficient values and their statistical significance (Venturini and Mehmetoglu 2019).

In our study, we employed R^2 as a measure of goodness-of-fit to compare the predictive power of the three models. The R^2 represents the proportion of variance in the dependent variable that can be explained by the independent variables in the model, making it a valuable tool in assessing the model's predictive accuracy. In our case, the dependent/endogenous variable of interest was the

Table 1 Descriptive statistics of sample

Variable	*n*	Percentage
Gender		
Man	423	49%
Woman	433	51%
Education		
Primary school	3	0%
Junior high school	56	7%
High school	538	63%
University degree or higher	259	30%
Income		
Below 2000€ per month	411	48%
Between 2000€ and 4000€ per month	368	43%
Above 4000€ per month	77	9%
Age		
18–24 years old	80	9%
25–34 years old	124	14%
35–44 years old	144	17%
45–54 years old	184	22%
55–64 years old	176	21%
65–75 years old	148	17%
Number of family members		
1	106	12%
2	243	28%
3	239	28%
4	202	24%
5 or more	66	8%
Italian geographical region		
Northern-West	230	27%
Northern-East	167	20%
Central	193	23%
Southern and Islands	266	31%
Favorite shopping place for food		
Supermarket	752	88%
Market	20	2%
Small shop	84	10%

behavioral intention to purchase food in biodegradable and compostable packaging. A higher R^2 value indicates a better ability of the model to predict the outcome of interest.

However, it is important to note that when comparing models with different specifications of the same endogenous constructs, over-reliance on R^2 may lead to the selection of a less efficient model (Hair et al. 2014). Adding an irrelevant, yet slightly correlated construct to the model can increase the R^2 value. To overcome this limitation, the evaluation of the models was based on the adjusted R^2, which penalizes the addition of irrelevant constructs and reduces the value when model complexity increases (Hair et al. 2014).

Additionally, in our study, we utilized the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) as additional measures to evaluate and compare the goodness-of-fit of the three models. AIC and BIC are statistical measures that take into account both the goodness-of-fit and model complexity (Ali et al. 2021). The AIC and BIC provide a trade-off between the goodness-of-fit and the complexity of the model. Lower AIC and BIC values indicate a better balance between model fit and complexity. These criteria penalize models with excessive complexity, thereby discouraging the inclusion of irrelevant or redundant constructs.

While R^2 focuses primarily on the explanatory power of the model, AIC and BIC consider both goodness-of-fit and parsimony. By considering multiple evaluation criteria, we aim to ensure that the selected model not only explains a significant proportion of the variance in behavioral intentions but also maintains a reasonable level of simplicity and avoids overfitting.

Results

TPB results

Regarding the PLS-SEM estimates for the TPB, Table 2 presents the results of the measurement model. The table includes the factor loadings, Cronbach's α, and rho A values for each construct. The factor loadings for all items were strong, indicating good convergent validity. Moreover, the Cronbach's α and rho A coefficients for all constructs were above the recommended threshold of 0.7, indicating good internal consistency reliability. The Cronbach's α values for Perceived Behavioral Control (PBC), Attitude (ATT), and Subjective Norm (SN) were 0.832, 0.840, and 0.928, respectively. The Cronbach's α value for Intention (INT) was 0.921. Overall, the results suggested that the TPB measurement model had good reliability and validity.

Figure 4 presents the results of the structural model with standardized direct effects between the considered constructs, showing that all path coefficients were

Table 2 TPB: Factor loadings, Cronbach's α, and rho *A* of the measurement model

	PBC	INT	ATT	SN
PBC.1	0.892			
PBC.2	0.872			
PBC.3	0.829			
INT.1		0.927		
INT.2		0.935		
INT.3		0.927		
ATT.1			0.898	
ATT.2			0.855	
ATT.3			0.856	
SN.1				0.947
SN.2				0.928
SN.3				0.930
Cronbach α	0.832	0.921	0.840	0.928
Rho *A*	0.845	0.921	0.846	0.929

PBC, Perceived Behavioral Control; *INT*, Intention; *ATT*, Attitude; *SN*, Subjective Norm

significant and with the expected sign/direction. Finally, the TPB model explained 57% of variance in behavioral intentions.

REM results

The PLS-SEM results of the measurement model for the REM showed strong relationships between latent constructs and items, with factor loadings ranging from 0.806 to 0.956 (Table 3). Discriminant validity for measurement models and multicollinearity check for structural models are presented in the Appendix (Tables 8, 9, 10, 11, 12, and 13).

Results of the structural model (Fig. 5) reveal that all relationships between the constructs were significant and in the expected direction, except for the relationship between Environmental Concern and Negative Emotions, which was non-significant. Additionally, while the relationship between Negative Emotions and Intention was statistically significant, the effect size was quite weak, with a standardized coefficient of −0.071. Finally, the REM accounted for 64% of the variance in Intention, representing an approximately 12% increase in adjusted R^2 compared to the TPB.

Extended TPB results

Regarding the TPB with emotional components, the measurement model demonstrated strong relationships between latent variables and their indicators, along with appropriate internal consistency, as indicated by rho *A* values ranging between 0.845 and 0.929 (Table 4).

The structural model, presented in Fig. 6, revealed significant relationships among latent variables, with standardized direct coefficients ranging from weak (Negative Emotions on Intention, $\beta = -0.075$) to moderate effects (Perceived Behavioral Control on Intention, $\beta = 0.341$).

Finally, Table 5 presents the statistics for model selection. The extended TPB, incorporating emotional components, exhibited a slight improvement in adjusted

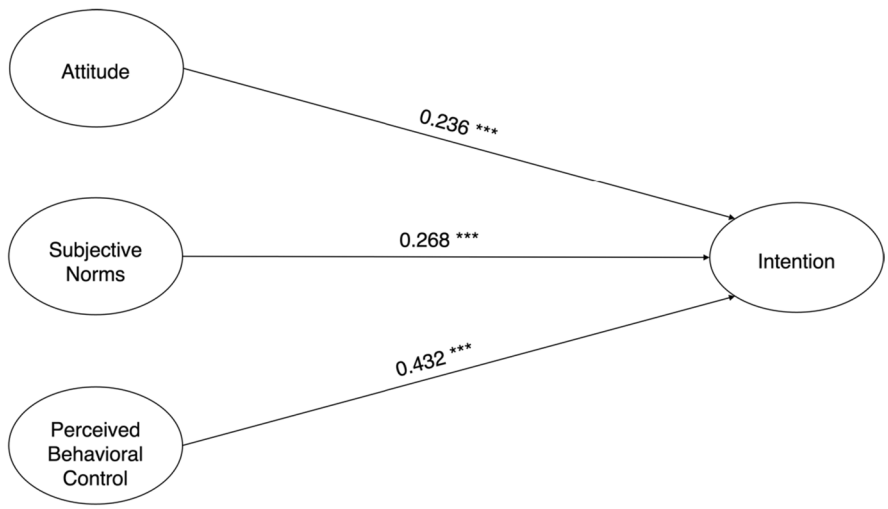

Fig. 4 TPB: Path coefficient values of the structural model. Note: ***$p < 0.001$; adjusted R^2 of Intention = 0.57

Table 3 REM: Factor loadings, Cronbach's α, and rho A of the measurement model

	EC	INT	CB	PE	NE
EC.1	0.823				
EC.2	0.806				
EC.3	0.855				
INT.1		0.926			
INT.2		0.935			
INT.3		0.927			
CB.1			0.827		
CB.2			0.848		
CB.3			0.867		
CB.4			0.826		
CB.5			0.845		
CB.6			0.826		
PE.1				0.877	
PE.2				0.860	
PE.3				0.888	
PE.4				0.852	
PE.5				0.880	
NE.1					0.956
NE.2					0.893
Cronbach α	0.771	0.921	0.917	0.921	0.838
Rho A	0.780	0.921	0.918	0.921	0.946

EC, Environmental Concern; *INT*, Intention; *CB*, Cognitive Benefits; *PE*, Positive Emotions; *NE*, Negative Emotions

R^2 compared to the traditional TPB model, providing a positive response to RQ2 — "Does the addition of emotional components to models with classical rational components enhance their predictive power?" Moreover, in response to RQ1 "Which of the two models demonstrates stronger predictive power in the context of sustainable packaging choices?" all model selection criteria indicate that the REM could represent a better model in terms of goodness-of-fit and parsimony when analyzing intention to buy food in sustainable packaging).

Discussion and implications

The introduction of innovative bioplastic packaging, such as biodegradable and compostable alternatives, has marked a significant milestone in reducing the usage of conventional plastics (Morinval and Averous 2022). This development has the potential to be a turning point, particularly for sectors that prioritize sustainability and the "green" movement, such as the organic food industry (Bazaluk et al. 2020). However, despite the increasing concern and awareness among consumers regarding the depletion of natural resources caused by excessive plastic consumption, the bioplastic market has not experienced explosive growth. The success of bioplastics relies heavily on consumer adoption of these alternatives in the market (Hermann et al. 2022). This paper aims to explore the key factors that significantly influence the selection of biodegradable and compostable packaging. To achieve this objective, we conducted an evaluation and comparison of two relevant models commonly employed in literature to understand individuals'

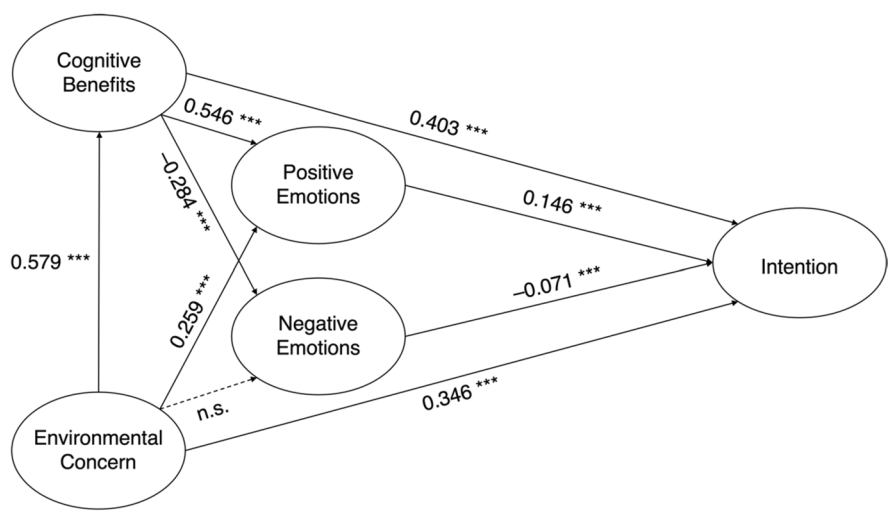

Fig. 5 REM: Path coefficient values of the structural model. Note: ***$p < 0.001$; adjusted R^2 of Intention = 0.64

Table 4 Extended TPB: Factor loadings, Cronbach's α, and rho *A* of the measurement model

	PE	NE	PBC	INT	ATT	SN
PE.1	0.875					
PE.2	0.862					
PE.3	0.887					
PE.4	0.852					
PE.5	0.882					
NE.1		0.952				
NE.2		0.899				
PBC.1			0.892			
PBC.2			0.872			
PBC.3			0.829			
INT.1				0.927		
INT.2				0.935		
INT.3				0.926		
ATT.1					0.898	
ATT.2					0.855	
ATT.3					0.856	
SN.1						0.947
SN.2						0.928
SN.3						0.930
Cronbach α	0.921	0.838	0.832	0.921	0.840	0.928
Rho *A*	0.921	0.915	0.845	0.921	0.846	0.929

PE, Positive Emotions; *NE*, Negative Emotions; *PBC*, Perceived Behavioral Control; *INT*, Intention; *ATT*, Attitude; *SN*, Subjective Norms

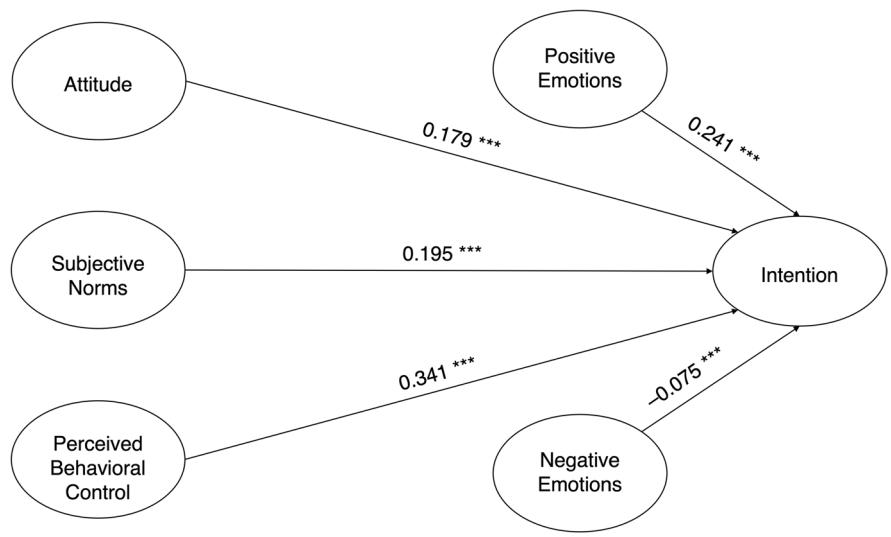

Fig. 6 Extended TPB: Path coefficient values of the structural model. Note: ***$p < 0.001$; adjusted R^2 of Intention = 0.61

intentions to engage in specific behaviors: the TPB model and the REM. The primary point of contention between these two models lies in the explicit inclusion or not of emotional components (positive and negative emotions) as predictors of the intention to choose biodegradable and compostable packaging.

The findings for the TPB demonstrated that the coefficients of each component construct within the model, including attitude, subjective norms, and perceived behavioral control, were statistically significant and aligned with the expected direction. Specifically, when individuals held a more positive overall evaluation of

Table 5 Comparison of models using R^2, adjusted R^2, AIC, and BIC

Model	R^2	Adjusted R^2	AIC	BIC	DF
TPB	0.571	0.570	1709.351	1723.608	3
REM	0.642	0.640	1557.714	1576.723	4
Extended TPB	0.616	0.614	1618.139	1641.901	5

DF, degrees of freedom

choosing biodegradable and compostable packaging (attitude), their intention to engage in such behavior was stronger. Furthermore, as individuals experienced greater social pressures from others to select biodegradable and compostable packaging (subjective norms), their intention to do so also increased. Additionally, when consumers perceived themselves as having more control and capability to purchase sustainable packaging (perceived behavioral control), their purchase intentions were higher. The latter result highlights the importance of ensuring favorable conditions, such as product availability, to facilitate consumers' decisions to purchase environmentally friendly products (de Leeuw et al. 2015). Overall, the TPB model accounted for 57% of the variance in behavioral intentions, confirming its longstanding effectiveness in understanding individuals' intentions to engage in specific behaviors.

The REM yielded some intriguing results. Firstly, the positive relationship between environmental concern and cognitive benefits was confirmed. This outcome emphasized that individuals with higher environmental concern tend to perceive greater cognitive benefits associated with biodegradable and compostable packaging, consistent with previous research findings (Koenig-Lewis et al. 2014; Chamorro et al. 2009). Additionally, environmental concern exhibited a positive and significant influence on purchase intention, affirming the impact of environmental concern on pro-environmental behavior (Duong et al. 2022). Furthermore, consumers' environmental concern significantly influenced positive emotions but had no significant effect on negative emotions. These results align with Koenig-Lewis et al. (2014) and indicate that individuals with a strong environmental concern experience heightened positive emotions in relation to biodegradable and compostable packaging, while the same does not hold true for negative emotions. Interestingly, the original study by Koenig-Lewis et al. (2014) also found that there was no significant relationship between environmental concern and negative emotions. However, they did discover that negative emotions played a significant mediating role in the relationship between environmental concern and behavioral intentions. Although the direct link between environmental concern and negative emotions was not significant, it proved to be crucial in the larger context of the model.

Regarding cognitive benefits, the model showed a positive and significant relationship with intentions and positive emotions, while exhibiting a negative and significant relationship with negative emotions. These findings underscore that the cognitive benefits associated with packaging positively affect purchase intentions. Moreover, the perceived benefits of ecologically responsible packaging have the ability to positively influence positive emotions associated with the behavior. Conversely, cognitive benefits showed a negative relationship with negative emotions. This finding, in line with Koenig-Lewis et al. (2014), suggests that if consumers lack knowledge about the benefits of biodegradable and compostable packaging, their choice of such innovative packaging may be associated with negative feelings, such as concerns.

Lastly, the results pertaining to the emotional aspect of the model revealed that positive and negative emotions linked to packaging strongly influenced purchase intention. These results confirm the central hypothesis of REM, which posits a strong predictive power of affective variables in predicting pro-environmental behavior (Carrus et al. 2008; Meneses 2010; Koenig-Lewis et al. 2014). Specifically, the effect of positive emotions on intention was found to be stronger than the effect of negative emotions, indicating that positive feelings exert a greater influence on intentions. These results underscore the significance of implementing strategies that target not only consumers' attitudes but also the affective consequences (positive and negative) that they imagine will be associated with green purchasing. For instance, a company promoting eco-friendly products could focus on creating marketing campaigns that not only highlight the environmental benefits of their products but also evoke positive emotions, such as a sense of fulfillment and pride in contributing to sustainability. They could use imagery and messaging that portrays individuals enjoying a cleaner and greener lifestyle, which appeals to consumers' emotional desire for positive experiences.

The findings of REM not only support the hypothesis of the relevant role of emotions in pro-environmental behavior but also accounted for 64% of the variance in intention, representing an

approximate 12% increase compared to the TPB. In other words, REM provides a better fit for explaining the intention to purchase food in biodegradable and compostable packaging.

In addition, we also attempted to extend the TPB model by incorporating the emotional variables (positive and negative emotions) derived from the REM. Both emotional variables were found to be significant, leading to a slight increase in R^2. However, the extended TPB model performed worse than the complete REM in terms of AIC, BIC, and adjusted R^2. This confirms that the REM model can be considered a powerful and efficient solution for explaining purchase intentions of food in biodegradable and compostable packaging.

The findings of the REM model have significant implications for marketing considerations, particularly in the context of organic food. Biodegradable and compostable packaging aligns well with the target consumers of organic food (Bazaluk et al. 2020; Magnier et al. 2016), making it an excellent solution for this category. The results demonstrate that both positive and negative emotions have an influence on the intention to purchase biodegradable and compostable packaging, emphasizing the importance of emotional appeals in marketing strategies.

In the case of organic food, it becomes crucial for marketing campaigns to evoke positive emotions associated with sustainable packaging. By highlighting the environmentally friendly aspects of biodegradable and compostable packaging, companies can tap into the values and concerns of organic food consumers, strengthening their intention to choose these packaging options.

Additionally, the results suggest that addressing consumers' cognitive benefits associated with biodegradable and compostable packaging is vital. If consumers perceive a low level of cognitive benefits, such as the environmental advantages or health implications of sustainable packaging, negative feelings may arise. To overcome this, manufacturers should implement strategies that effectively communicate and emphasize all the benefits of sustainable packaging materials, especially in relation to organic food. This approach will help mitigate negative emotions and create a more positive consumer response.

Overall, the findings emphasize the need for marketing strategies to appeal to consumers' emotional responses, address their cognitive concerns, and highlight the specific benefits of biodegradable and compostable packaging.

Concluding remarks and limitations

In conclusion, our study contributes to the literature on pro-environmental behavior by providing a comparison between two models used to predict the intention to choose biodegradable and compostable packaging. The main contributions of our study are as follows:

(i) The TPB effectively explains the intention to choose biodegradable and compostable packaging, with the relationships among its main constructs (attitude, subjective norms, and perceived behavioral control) aligning with expectations. The TPB model accounted for 57% of the variance in behavioral intentions.

(ii) The REM demonstrated that incorporating emotional components along with rational variables enhances the predictive power of the model. The REM accounted for 64% of the variance in intention, representing an approximately 12% increase in adjusted R^2 compared to the TPB model.

(iii) To leverage the power of these models, it is important to stimulate both positive and negative emotions to encourage consumers to choose biodegradable and compostable packaging. By appealing to consumers' emotions, marketers can enhance their intention to select sustainable packaging options.

However, it is important to acknowledge some limitations of our study. Firstly, we did not address the intention-behavior gap by considering the actual purchasing behavior of consumers. Future research could explore the alignment between intention and behavior in relation to biodegradable and compostable packaging. Additionally, it would be interesting to compare the same models in different cultural contexts to analyze the variations in outcomes and implications.

Overall, our study enhances our understanding of the factors influencing the intention to choose biodegradable and compostable packaging and highlights the importance of emotional components in shaping pro-environmental behavior.

Appendix

Table 6 Items' descriptions and main statistics of the TPB constructs

	Description	Mean	SD	Min	Max
PBC.1	It is possible for me to purchase food in biodegradable and compostable packaging in the near future.	4.12	0.85	1	5
PBC.2	If I wanted to buy food in biodegradable and compostable packaging in the near future, I would have no difficulty.	4.05	0.91	1	5
PBC.3	Purchasing food in biodegradable and compostable packaging in the near future is solely up to me.	4.05	0.91	1	5
ATT.1	Purchasing food in biodegradable and compostable packaging in the near future would be for me... [Useless/Useful]	4.13	1.17	1	5
ATT.2	Purchasing food in biodegradable and compostable packaging in the near future would be for me... [Irresponsible/Responsible]	4.21	1.13	1	5
ATT.3	Purchasing food in biodegradable and compostable packaging in the near future would be for me... [Unsatisfactory/Satisfactory]	4.16	1.05	1	5
SN.1	People important to me think that I should buy food in biodegradable and compostable packaging in the near future.	3.82	0.96	1	5
SN.2	People important to me expect that in the near future I will buy food in biodegradable and compostable packaging.	3.81	0.96	1	5
SN.3	People important to me would like me to buy food in biodegradable and compostable packaging in the near future.	3.79	0.98	1	5
INT.1	I intend to purchase, in the near future, food in biodegradable and compostable packaging.	4.12	0.86	1	5
INT.2	I plan to purchase food in biodegradable and compostable packaging in the near future.	4.09	0.88	1	5
INT.3	I will purchase food in biodegradable and compostable packaging in the near future.	4.09	0.88	1	5

PBC, Perceived Behavioral Control; *ATT*, Attitude; *SN*, Subjective Norm; *INT*, Intention

Table 7 Items' descriptions and main statistics of the REM constructs

	Description	Mean	SD	Min	Max
EC.1	I make a special effort to buy paper and plastic products that are made from recycled materials.	3.80	0.96	1	5
EC.2	I have switched products for ecological reasons.	3.50	1.03	1	5
EC.3	When I have a choice between two equal products, I purchase the one less harmful to other people and the environment.	3.90	1.00	1	5
CB.1	Biodegradable and compostable packages for food reduce the dependence on non-renewable resources.	4.04	0.88	1	5
CB.2	Biodegradable and compostable packages for food will benefit the planet to a great deal.	4.13	0.86	1	5
CB.3	Biodegradable and compostable packages for food help to reduce environmental problems.	4.17	0.83	1	5
CB.4	Biodegradable and compostable packages for food generate less CO2 emissions during production than conventional plastic packages.	3.99	0.89	1	5
CB.5	Biodegradable and compostable packages for food are environmentally friendly.	4.25	0.82	1	5
CB.6	Biodegradable and compostable packages for food help to avoid global warming.	4.00	0.90	1	5
PE.1	Knowing that you are buying food in biodegradable and compostable packaging would make you feel happy.	3.89	0.94	1	5
PE.2	Knowing that you are buying food in biodegradable and compostable packaging would make you feel optimistic.	4.01	0.94	1	5
PE.3	Knowing that you are buying food in biodegradable and compostable packaging would make you feel enthusiastic.	3.89	0.95	1	5
PE.4	Knowing that you are buying food in biodegradable and compostable packaging would make you feel proud.	4.04	0.94	1	5
PE.5	Knowing that you are buying food in biodegradable and compostable packaging would make you feel content.	4.04	0.91	1	5
NE.1	Knowing that you are buying food in biodegradable and compostable packaging would make you feel nervous.	2.01	1.19	1	5
NE.2	Knowing that you are buying food in biodegradable and compostable packaging would make you feel worried.	2.31	1.30	1	5
INT.1	I intend to purchase, in the near future, food in biodegradable and compostable packaging.	4.12	0.86	1	5
INT.2	I plan to purchase food in biodegradable and compostable packaging in the near future.	4.09	0.88	1	5
INT.3	I will purchase food in biodegradable and compostable packaging in the near future.	4.09	0.88	1	5

EC, Environmental Concern; *CB*, Cognitive Benefits; *PE*, Positive Emotions; *NE*, Negative Emotions; *INT*, Intention

Table 8 TPB: Discriminant validity with the Fornell-Larcker criterion

	PBC	INT	ATT	SN
PBC	–			
INT	0.459	–		
ATT	0.152	0.249	–	
SN	0.327	0.358	0.122	–
AVE	0.748	0.864	0.757	0.875

PBC, Perceived Behavioral Control; *INT*, Intention; *ATT*, Attitude; *SN*, Subjective Norm

Table 9 TPB: Multicollinearity check for the structural model (Variance Inflated Factors (VIFs))

	INT
PBC	1.583
ATT	1.213
SN	1.529

PBC, Perceived Behavioral Control; *INT*, Intention; *ATT*, Attitude; *SN*, Subjective Norm

Table 10 REM: Discriminant validity with the Fornell-Larcker criterion

	EC	INT	CB	PE	NE
EC	–				
INT	0.457	–			
CB	0.335	0.525	–		
PE	0.327	0.419	0.478	–	
NE	0.037	0.097	0.090	0.131	–
AVE	0.685	0.864	0.706	0.760	0.855

EC, Environmental Concern; *INT*, Intention; *CB*, Cognitive Benefits; *PE*, Positive Emotions; *NE*, Negative Emotions

Table 11 REM: Multicollinearity check for the structural model (Variance Inflated Factors (VIFs))

	INT	CB	PE	NE
EC	1.647	1.000	1.503	1.503
CB	2.133		1.503	1.503
PE	2.210			
NE	1.160			

EC, Environmental Concern; *INT*, Intention; *CB*, Cognitive Benefits; *PE*, Positive Emotions; *NE*, Negative Emotions

Table 13 Extended TPB: Multicollinearity check for the structural model (Variance Inflated Factors (VIFs))

	INT
PEmo	1.972
NEmo	1.236
PBC	1.769
ATT	1.303
SN	1.813

PEmo, Positive Emotions; *NEmo*, Negative Emotions; *PBC*, Perceived Behavioral Control; *INT*, Intention; *ATT*, Attitude; *SN*, Subjective Norms

Table 12 Extended TPB: Discriminant validity with the Fornell-Larcker criterion

PE, Positive Emotions; *NE*, Negative Emotions; *PBC*, Perceived Behavioral Control; *INT*, Intention; *ATT*, Attitude; *SN*, Subjective Norms

	PE	NE	PBC	INT	ATT	SN
PE	–					
NE	0.131	–				
PBC	0.328	0.054	–			
INT	0.420	0.096	0.459	–		
ATT	0.161	0.083	0.152	0.248	–	
SN	0.333	0.007	0.327	0.358	0.122	–
AVE	0.760	0.857	0.748	0.864	0.757	0.875

Author contributions AL conceived and designed this research; GC and FC contributed to the methodology and the formal analysis and investigation of the data; GC also performed data curation; AL wrote the paper; FC, TdG, and LC reviewed and edited the paper; LC supervised the research. All authors read and approved the final manuscript.

Funding Open access funding provided by Università degli Studi di Napoli Federico II within the CRUI-CARE Agreement. This research received grant from the project BIODEGRAPACK: "Pellicole EMAP innovative basate sull'utilizzo di materie prime rinnovabili e biodegradabili per una migliore shelf life e qualità dei prodotti biologici" — E78D19000800001 — funded by the Italian Ministry of Agricultural Policies (MIPAAF).

Data availability The data that support the findings of this study are available from the authors upon reasonable request.

Declarations

Informed consent and ethical aspects involving human participants Participants were informed about the topic of the study and gave informed consent before participating, in accordance with the principles outlined in the Declaration of Helsinki.

Competing interests The authors declare no competing interests.

References

Ajzen I (1991) The theory of planned behavior. Organ Behav Hum Decis Process 50:179–211

Ajzen I (2011) The theory of planned behavior: reactions and reflections. Psychol Health 26:1113–1127

Albayrak T, Aksoy Ş, Caber M (2013) The effect of environmental concern and scepticism on green purchase behaviour. Mark Intell Plan 31:27–39

Ali S, Javed HMU, Danish M (2021) Adoption of green IT in Pakistan: a comparison of three competing models through model selection criteria using PLS-SEM. Environ Sci Pollut Res 28:36174–36192

Asif MH, Zhongfu T, Irfan M, Işık C (2023) Do environmental knowledge and green trust matter for purchase intention of eco-friendly home appliances? An application of extended theory of planned behavior. Environ Sci Pollut Res 30:37762–37774

Bazaluk O, Yatsenko O, Zakharchuk O, Ovcharenko A, Khrystenko O, Nitsenko V (2020) Dynamic development of the global organic food market and opportunities for Ukraine. Sustainability 12:6963. https://doi.org/10.3390/su12176963

Borrello M, Pascucci S, Caracciolo F, Lombardi A, Cembalo L (2020) Consumers are willing to participate in circular business models: a practice theory perspective to food provisioning. J Clean Prod 259:121013

Cammarelle A, Viscecchia R, Bimbo F (2021) Intention to purchase active and intelligent packaging to reduce household food waste: evidence from Italian Consumers. Sustainability 13:4486. https://doi.org/10.3390/su13084486

Carlson L, Kangun GN (1993) A content analysis of environmental advertising claims: a matrix method approach. J Advert 22:27–39

Carrus G, Passafaro P, Bonnes M (2008) Emotions, habits and rational choices in ecological behaviours: the case of recycling and use of public transportation. J Environ Psychol 28:51–62

Carvajal SC, Hanson C, Downing RA, Coyle KK, Pederson LL (2004) Theory-based determinants of youth smoking: a multiple influence approach. J Appl Soc Psychol 34:59–84. https://doi.org/10.1111/j.1559-1816.2004.tb02537.x

Caso D, Capasso M, Fabbricatore R, Conner M (2022) Understanding the psychosocial determinants of Italian parents' intentions not to vaccinate their children: an extended theory of planned behaviour model. Psychol Health 37:1111–1131

Chaihanchanchai P, Anantachart S (2023) Encouraging green product purchase: green value and environmental knowledge as moderators of attitude and behavior relationship. Bus Strat Environ 32:289–303

Chamorro A, Rubio S, Miranda FJ (2009) Characteristics of research on green marketing. Bus Strat Env 18:223–239

de Leeuw A, Valois P, Ajzen I, Schmidt P (2015) Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: implications for educational interventions. J Environ Psychol 42:128–138. https://doi.org/10.1016/j.jenvp.2015.03.005

Dharmadhikari S (2012) Eco-friendly packaging in supply chain. IUP J Supply Chain Manag 9:7

Diamantopoulos A, Schlegelmilch BB, Sinkovics RR, Bohlen GM (2003) Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. J Bus Res 56:465–480. https://doi.org/10.1016/S0148-2963(01)00241-7

Duong CD, Doan XH, Vu DM, Ha NT, Dam KV (2022) The role of perceived environmental responsibility and environmental concern on shaping green purchase intention. Vision. https://doi.org/10.1177/09722629221092117

Findrik E, Meixner O (2023) Drivers and barriers for consumers purchasing bioplastics–a systematic literature review. J Clean Prod 410:137311. https://doi.org/10.1016/j.jclepro.2023.137311

Fishbein M, Ajzen I (2011) Predicting and changing behavior: the reasoned action approach. Taylor and Francis

Fraj E, Martinez E (2006) Ecological consumer behavior: an empirical analysis. Int J Consum Stud 31:26–33

Frijda N, Mesquita B (1994) The social roles and functions of emotions. In: Kitayama S, Markus H (eds) Emotion and culture. American Psychological Association, Washington, DC

Frommeyer B, Wagner E, Hossiep CR, Schewe G (2022) The utility of intention as a proxy for sustainable buying behavior–a necessary condition analysis. J Bus Res 143:201–213

Gallagher R, Raimondo M, Caracciolo F (2022) Eating the "inedible": how to improve the consumption of the perceived inedible parts of fruits and vegetables in Ireland and Italy? Food Qual Prefer 99:104548

Giannoutsos K, Koukoumaki DI, Panagiotou M, Gkatzionis K (2023) The effect of modern claim related to packaging sustainability on the sensory perception of traditional Greek rusks (paximathi). Food Qual Prefer 106:104817. https://doi.org/10.1016/j.foodqual.2023.104817

Godin G, Kok G (1996) The theory of planned behavior: a review of its applications to health-related behaviors. Am J Health Promot 11:87–98

Hair JF, Ringle CM, Sarstedt M (2011) PLS-SEM: indeed a silver bullet. J Mark Theory Pract 19:139–152

Hair JF, Sarstedt M, Hopkins L, Kuppelwieser VG (2014) Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research. Eur Bus Rev 26:106–121

Harth NS, Leach CW, Kessler T (2013) Guilt, anger, and pride about in-group environmental behaviour: different emotions predict distinct intentions. J Environ Psychol 34:18–26

Hartmann P, Apaolaza-Ibáñez V (2008) Virtual nature experiences as emotional benefits in green product consumption the moderating role of environmental attitudes. Environ Behav 40:818–842

Herbes C, Beuthner C, Ramme I (2018) Consumer attitudes towards biobased packaging – a cross-cultural comparative study. J Clean Prod 194:203–218. https://doi.org/10.1016/j.jclepro.2018.05.106

Hermann C, Rhein S, Sträter KF (2022) Consumers' sustainability-related perception of and willingness-to-pay for food packaging alternatives. Resour Conserv Recycl 181:106–219. https://doi.org/10.1016/j.resconrec.2022.106219

Hughner RS, McDonagh P, Prothero A, Shultz CJ, Stanton J (2007) Who are organic food consumers? A compilation and review of why people purchase organic food. J Consum Behav 6:94–110. https://doi.org/10.1002/cb.210

Jose J, Biju MK, Vincent B (2022) Does consumer attitude influence sustainable buying behavior of branded organic food consumers? The mediating role of green consumption value in predicting the relationship. IUP J Mark Manag 21:70–86

Ketelsen M, Janssen M, Hamm U (2020) Consumers' response to environmentally-friendly food packaging - a systematic review. J Clean Prod 254:120–123. https://doi.org/10.1016/j.jclepro.2020.120123

Kim YJ, Njite D, Hancer M (2013) Anticipated emotion in consumers' intentions to select eco-friendly restaurants: augmenting the theory of planned behavior. Int J Hosp Manag 34:255–262

Koenig-Lewis N, Palmer A, Dermody J, Urbye A (2014) Consumers' evaluations of ecological packaging–rational and emotional approaches. J Environ Psychol 37:94–105

Lazarus RS (1991) Emotion and adaptation. Oxford University Press, New York

Lerro M, Vecchio R, Caracciolo F, Pascucci S, Cembalo L (2018) Consumers' heterogeneous preferences for corporate social responsibility in the food industry. Corp Soc Resp Env Ma 25:1050–1061

Limbu YB, Wolf M, Lunsford D (2012) Perceived ethics of online retailers and consumer behavioral intentions: the mediating roles of trust and attitude. J Res Interact Mark 6:133–154

Magnier L, Schoormans J, Mugge R (2016) Judging a product by its cover: packaging sustainability and perceptions of quality in food products. Food Qual Prefer 53:132–142

Manstead ASR (2000) The role of moral norms in the attitude-behaviour relation. In: Terry DJ, Hogg MA (eds) Attitudes, behaviour and social context. Lawrence Erlbaum Associates, Mahwah, NJ

Meneses GD (2010) Refuting fear in heuristics and in recycling promotion. J Bus Res 63:104–110

Michaliszyn-Gabryś B, Krupanek J, Kalisz M, Smith J (2022) Challenges for sustainability in packaging of fresh vegetables in organic farming. Sustainability 14:5346. https://doi.org/10.3390/su14095346

Mitrano DM, Wagner M (2022) A sustainable future for plastics considering material safety and preserved value. Nat Rev Mater 7:71–73. https://doi.org/10.1038/s41578-021-00406-9

Moons I, De Pelsmacker P (2012) Emotions as determinants of electric car usage intention. J Mark Manag 28:195–237

Morinval A, Averous L (2022) Systems based on biobased thermoplastics: from bioresources to biodegradable packaging applications. Polym Rev 62:653–721. https://doi.org/10.1080/15583724.2021.2012802

Moser AK (2015) Thinking green, buying green? Drivers of pro-environmental purchasing behavior. J Consum Mark 32:167–175

Nguyen AT, Parker L, Brennan L, Lockrey S (2020) A consumer definition of eco-friendly packaging. J Clean Prod 252:119792

Norton V, Waters C, Oloyede OO, Lignou S (2022) Exploring consumers' understanding and perception of sustainable food packaging in the UK. Foods 11:3424

Oatley K, Keltner D, Jenkins JM (2006) Understanding emotions, 2nd edn. John Wiley and Sons, Blackwell

Osgood CE (1964) Semantic differential technique in the comparative study of cultures. Am Anthropol 66:171–200

Pallathadka LK, Pallathadka H, Manoharmayum DD (2022) An empirical study on demand and consumers perception of organic food products. Integr J Res Arts Humanit 2:189–194

Pearson D, Henryks J, Jones H (2011) Organic food: what we know (and do not know) about consumers. Renew Agric Food Syst 26:171–177

Prakash G, Pathak P (2017) Intention to buy eco-friendly packaged products among young consumers of India: a study on developing nation. J Clean Prod 141:385–393. https://doi.org/10.1016/j.jclepro.2016.09.116

Raimondo M, Hamam M, D'Amico M, Caracciolo F (2022) Plastic-free behavior of millennials: an application of the theory of planned behavior on drinking choices. Waste Manage 138:253–261. https://doi.org/10.1016/j.wasman.2021.12.004

Ramayah T, Lee JWC, Mohamad O (2010) Green product purchase intention: some insights from a developing country. Resour Conserv Recycl 54:1419–1427

Rana J, Paul J (2017) Consumer behavior and purchase intention for organic food: a review and research agenda. J Retail Consum Serv 38:157–165. https://doi.org/10.1016/j.jretconser.2017.06.004

Rivis A, Sheeran P, Armitage CJ (2009) Expanding the affective and normative components of the theory of planned behavior: a meta-analysis of anticipated affect and moral norms. J App Soc Psychol 39:2985–3019. https://doi.org/10.1111/j.1559-1816.2009.00558.x

Sánchez-Bravo P, Chambers E, Noguera-Artiaga L, López-Lluch D, Chambers E IV, Carbonell-Barrachina ÁA, Sendra E (2020) Consumers' attitude towards the sustainability of different food categories. Foods 9:1608. https://doi.org/10.3390/foods9111608

Sandberg T, Conner M (2008) Anticipated regret as an additional predictor in the theory of planned behaviour: a meta-analysis. Br J Soc Psychol 47:589–606

Sharma A, Foropon C (2019) Green product attributes and green purchase behavior: a theory of planned behavior perspective with implications for circular economy. Manag Decis 57:1018–1042. https://doi.org/10.1108/MD-10-2018-1092

Sparks P, Shepherd R (2002) The role of moral judgements within expectancy value-based attitude-behaviour models. Ethics Behav 12:299–321

Steenis ND, van der Lans IA, van Herpen E, van Trijp HC (2018) Effects of sustainable design strategies on consumer preferences for redesigned packaging. J Clean Prod 205:854–865. https://doi.org/10.1016/j.jclepro.2018.09.137

Suki NM (2016) Consumer environmental concern and green product purchase in Malaysia: structural effects of consumption values. J Clean Prod 132:204–214

Venturini S, Mehmetoglu M (2019) plssem: a Stata package for structural equation modeling with partial least squares. J Stat Softw. https://doi.org/10.18637/jss.v088.i08

Walker TR (2021) (Micro) plastics and the UN sustainable development goals. Curr Opin Green Sustain Chem 30:100497. https://doi.org/10.1016/j.cogsc.2021.100497

Wang Y, Long X, Li L, Wang Q, Ding X, Cai S (2021) Extending theory of planned behavior in household waste sorting in China: the moderating effect of knowledge, personal involvement, and moral responsibility. Environ Dev Sustain 23:7230–7250

Yao J, Guo X, Wang L, Jiang H (2022) Understanding green consumption: a literature review based on factor analysis and bibliometric method. Sustainability 14:8324. https://doi.org/10.3390/su14148324

Zanoli R, Naspetti S (2002) Consumer motivations in the purchase of organic food: a means-end approach. Br Food J 104:643–653. https://doi.org/10.1108/00070700210425930