



Perceived greenwashing and its impact on eco-friendly product purchase

Greenwashing percebido e o seu impacto na compra de produtos ecológicos

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Abstract

The main aim of this article is to investigate the effect of perceived greenwashing on consumers' purchasing behavior of eco-friendly products. Twelve research hypotheses were defined based on contributions from the literature. To test these hypotheses, a quantitative methodology was employed, collecting data through an online survey (N = 270) and using SmartPLS for analysis. The results confirm that perceived both perceived greenwashing and perceived risk have a negative influence on consumer attitudes. While their direct effects on purchase intention were found to be insignificant, both perceived greenwashing and perceived risk had a significant negative indirect effect on purchase intention through attitude. Additionally, it was confirmed that purchase behavior is positively affected by attitude and by willingness to pay more. These results contribute to addressing the limited knowledge regarding the impact of consumers' perceived greenwashing on their behavior, especially concerning different product types. Furthermore, they provide valuable insights for managers, highlighting the importance of mitigating greenwashing and risk perceptions associated with eco-friendly products due to their indirect negative impacts on purchase intention and behavior.

Keywords: Greenwashing, Eco-friendly products, Environmental sustainability, Consumer behavior.

Resumo

O principal objetivo deste artigo é investigar o efeito do *greenwashing* percebido no comportamento de compra de produtos ecológicos. Com base nas contribuições da literatura foram definidas doze hipóteses. Adotou-se metodologia quantitativa, recolhendo dados através de um inquérito online (N = 270) e usando o SmartPLS para análise. Os resultados confirmam que tanto o *greenwashing* percebido como o risco percebido têm uma influência negativa nas atitudes dos consumidores. Embora não se tenha verificado efeitos diretos na intenção de compra, verificou-se para ambos um efeito indireto negativo significativo através das atitudes. Além disso, foi confirmado que o comportamento de compra é influenciado positivamente pelas atitudes e pela disposição para pagar mais. Estes resultados contribuem para o conhecimento sobre o impacto do *greenwashing* percebido no comportamento do consumidor, especialmente no que diz respeito a diferentes tipos de produtos. Para os gestores, destaca-se a importância de mitigar o *greenwashing* e as percepções de risco associadas aos produtos ecológicos devido aos seus impactos negativos indiretos na intenção e no comportamento de compra.

Palavras-chave: *Greenwashing*, Produtos ecológicos, Sustentabilidade ambiental, Comportamento do consumidor.

1. Introduction

Greenwashing refers to a widespread phenomenon in which companies exaggerate or falsely represent their environmentally-friendly practices (Baum, 2012; Delmas & Burbano, 2011; Seele & Gatti, 2017; Torelli et al., 2020), or the environmental advantages of their goods or services (Delmas & Burbano, 2011; Torelli et al., 2020), typically through information included in labeling, advertising, packaging, and product certification (Torelli et al., 2020). This is a managerial issue that has become increasingly prevalent in recent decades (Torelli et al., 2020). Greenwashing not only negatively impacts customer experience, loyalty, and satisfaction (Braga Junior et al., 2019) but can also damage a firm's reputation and profitability (Chen & Chang, 2013; De Jong et al., 2018; Nyilasy et al., 2014). Consumers, especially younger generations, are increasingly concerned about the social and environmental practices of business (Quach et al., 2022). They may identify greenwashing at the product level when environmental claims are perceived as vague or false (Delmas & Burbano, 2011), which can lead to confusion and skepticism (Baum, 2012).



In recent years, there has been a growing body of research on greenwashing, offering opportunities for various fields of study (Torelli et al., 2020). However, there is limited knowledge on the impact perceived greenwashing may have on consumer behavior (Rizzi et al., 2022), particularly in relation to different product types (De Jong et al., 2018). To address this gap, the main aim of this study is to investigate the effect of perceived greenwashing on consumers' purchasing behavior with regards to eco-friendly products. This research is guided by the "Theory of Planned Behavior (TPB)" and the "Theory of Perceived Risk (TPR)". The rationale behind these theories is explained in the following section.

2. Literature review and hypothesis development

The Theory of Planned Behavior (TPB) provides insights into the relationship between "consumers' attitudes, subjective norms, and perceived control" and has been employed by extant literature to predict environmentally conscious consumer behavior (e.g., Yadav & Pathak, 2017). According to the TPB, purchase intention drives an individual's purchasing decisions (Ajzen, 2020; Fishbein & Ajzen, 1977). It represents the likelihood of a consumer purchasing a specific product or service (Fishbein & Ajzen, 1977). Furthermore, this theory states that a high level of purchase intention often indicates a likelihood of actual purchase (Fishbein & Ajzen, 1977). The TPB also highlights attitude as a crucial determinant of behavioral intentions, defined as a consumer's positive or negative view of a product (Fishbein & Ajzen, 1977), which is influenced by their beliefs. Attitude and purchase intention are two widely adopted variables for explaining consumer behavior, including purchasing.

The TPB has been widely employed to study green consumer behavior (Ajzen, 2020) and has demonstrated reliability and adaptability, namely by allowing the inclusion of additional variables to further explain purchase intention and behavior (Teixeira et al., 2021; Yadav & Pathak, 2017). This facilitates the consideration of the factors associated with perceived greenwashing and consumer behavior, particularly perceived risk, willingness to pay more, and perceived differentiation.

2.1 Perceived Greenwashing

Greenwashing is a subjective phenomenon that depends on the balance between expectations, messages, and perceptions (Seele & Gatti, 2017). Nyilasy et al. (2014) describe perceived greenwashing as an individual's perception of misleading green communication related to companies or products. Perceived greenwashing is expected to impact consumer attitudes. There is a common belief among consumers that environmentally sustainable products are safer and better for the environment (Khoiriyah et al., 2018; Pekersen & Canöz, 2022), which leads to an all-around positive attitude toward these products is widespread (Park & Lin, 2020; Kement et al., 2023). However, when consumers detect instances of greenwashing, they are more likely to mistrust advertising claims, which can negatively affect their attitude toward the products (Chang & Hung, 2023). Therefore,

H1: Perceived greenwashing has a negative influence on attitude.

Additionally, several researchers have found that perceived greenwashing results in a decrease in purchase intention (Nguyen et al., 2019; Tarabieh, 2021), as this perception leads consumers to consider the claims of the product as overstated, vague, or false (Delmas & Burbano, 2011). Previous studies confirmed that greenwashing has a negative influence on the purchase intention of single-use products (Chang & Hung, 2023), and on the purchase of sustainably labeled clothing products (Apaolaza et al., 2023; Sun & Shi, 2022). Hence,

H2: Perceived greenwashing has a negative influence on purchase intention.

2.2 Perceived Risk

The Theory of Perceived Risk (TPR) emphasizes the impact of potential losses and negative consequences on consumers' purchase intention in specific situations (Trinh et al., 2021). Perceived risk is the level of uncertainty and seriousness of outcome that a consumer experiences during the decision-making process, and it is associated with the expectation of potential losses. In line with Uhm et al. (2022), this study defined perceived risks as the level of uncertainty that a consumer perceives when deciding whether to purchase eco-friendly products. Despite the significant role perceived risk has on various consumer behavior contexts, there has been limited empirical research on this issue regarding eco-friendly products (Chen & Chang, 2013). The existing literature suggests that there is a relationship between risk and eco-friendly products in greenwashing (Sadiq et al., 2021). Yet, greenwashing practices by organizations have been linked to an increase in consumer skepticism about eco-friendly goods and services (Huang & Li, 2017), resulting in increased perceived risk and "green" skepticism (Lin et al., 2017). Additionally, ambiguous and misleading claims can also raise the perception of risk, as consumers may perceive the use of environmentally sustainable products as potentially damaging to their image or reputation (Mustiko & Sutikno, 2015). Empirical studies have shown that greenwashing positively influences perceived risk (Lu et al., 2022). Therefore,

H3: Perceived greenwashing positively influences perceived risk.



The literature suggests that “consumers' attitudes towards eco-friendly products” may be influenced by perceived risk (Chen & Chang, 2013; Tarabieh, 2021). Several studies have confirmed that a high perceived risk in environmentally sustainable products results in a negative attitude towards them (Braga Junior et al., 2019). Hence,

H4: Perceived risk negatively influences attitude.

As a risk represents uncertainty about the outcome, it directly affects consumers' purchase intention (Zhuang et al., 2021). The Perceived Risk Theory supports this conclusion, and numerous studies have demonstrated that perceived risk negatively impacts purchase intention, particularly for environmentally sustainable products (Chen & Chang, 2013; Lu et al., 2022; Tarabieh, 2021). Thus,

H5: Perceived risk negatively influences purchase intention.

2.3 Perceived Differentiation

Environmental sustainability serves as a means of differentiation for organizations. Companies are utilizing green marketing practices to make their products eco-friendly by incorporating features that have a lower environmental impact. These products are distinctive, they stand out from other products, and align with the growing environmental awareness among consumers (Martínez et al., 2020; Qi et al., 2020). The development of eco-friendly products has the potential to create market opportunities (Dangelico, 2016), and enhance a company's profits and revenue (Awan et al., 2021).

Consumers tend to view environmentally sustainable products as having several benefits, such as being natural, healthy, having a higher quality, and promoting animal welfare, which is different when compared to their view of conventional products (Nguyen & Dekhili, 2019). When consumers recognize these differences, they develop a positive attitude toward sustainable products (Tseng & Hung, 2013). Hence, the following hypothesis is defined:

H6: Perceived differentiation positively influences attitude.

Similarly, the attributes of the product can affect consumer purchase behavior, and perceived product differentiation plays a crucial role in determining purchase intention (Varah et al., 2020). Consequently, when consumers do not perceive any differences between eco-friendly products and traditional products, their purchase intention is negatively affected (Drugova et al., 2020). Since as product differentiation, including the perceived attributes of eco-friendly products, affects purchase intention, it is hypothesized that:

H7: Perceived differentiation positively influences purchase intention.

2.4 Willingness to Pay More

Environmentally sustainable products are often more expensive than traditional products (Berger, 2019), and consumers often have to pay a premium price for eco-friendly products (Biswas & Roy, 2016). This phenomenon is referred to as Willingness to Pay More (WPM), which represents the consumers' willingness to pay a higher price for an environmentally sustainable version of the product (Oesman, 2021). Some consumers are willing to pay a premium price for eco-friendly products due to their concern for the environment (Braga Junior et al., 2019; Kim et al., 2017; Shahsavari et al., 2020).

Consumer attitude is one of the factors that affects WPM for environmentally sustainable products. Previous studies, such as Niwarthana et al. (2020) on sustainable products in general and Li et al. (2018) on eco-friendly housing, have shown a positive correlation between these variables. Thus,

H8: Attitude positively influences willingness to pay more.

Price plays a critical role in determining consumers' purchase intention (Berger, 2019); however, environmentally sustainable products often come at a premium price, which tends to negatively influence consumers' green purchase intention (Berger, 2019; Varah et al., 2020). Research has shown that the WPM positively impacts the purchase intention of eco-friendly products (Kim et al., 2017; Shahsavari et al., 2020; Varah et al., 2020; Yadav & Pathak, 2017). Therefore,

H9: Willingness to pay more positively influences purchase intention.

Additionally, the WPM for environmentally sustainable products is a predictor of consumer buying behavior (Molinillo et al., 2020; Yadav & Pathak, 2017). Thus, it is assumed that the behavior of the variables in question will affect purchase behavior in eco-friendly products. Thus,

H10: Willingness to pay more positively influences purchase behavior.



2.5 Attitude, Intention, and Behavior

In line with the main contributions from the TPB (Ajzen, 2020; Fishbein & Ajzen, 1977), consumer attitude towards environmentally sustainable products is considered a crucial factor in predicting their green purchasing behavior (Arli et al., 2018; Santos et al., 2023; Zaremohzzabieh et al., 2021), the more favorable the consumer's attitude towards these products, the stronger their purchase intention will be. The role that attitudes play in shaping consumer purchase intention of eco-friendly products has also been highlighted by extant research (Chang & Hung, 2023; Gleim et al., 2023; Sun & Shi, 2022). Thus,

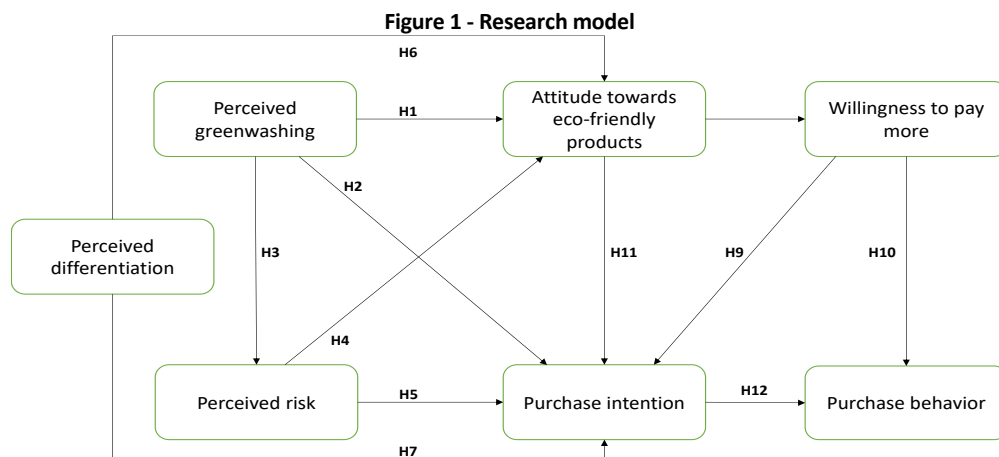
H11: Attitude positively influences purchase intention.

While the importance of purchase intention in predicting actual purchasing behavior has been recognized (Indrawati et al., 2022), most studies have focused on understanding the factors that influence consumers' intentions to purchase eco-friendly products rather than their actual purchasing behavior. Although green purchase intention may not always result in actual purchases, several studies (e.g., Jaiswal & Kant, 2018; Zhuang et al., 2021) have confirmed that consumers' intentions to purchase eco-friendly products have a positive impact on their actual purchasing behavior. Hence,

H12: Purchase intention positively influences purchase behavior.

Furthermore, the role of attitude as a mediator has been examined in prior studies (Gleim et al., 2023; Pop et al., 2023). Utilizing the TPB, Kim et al. (2013) and Wang et al. (2022) showed that attitude mediates the effect of subjective norm and behavioral intention. Likewise, Yeh et al. (2021) and Wang et al. (2022) confirmed the mediating effect of attitude between behavioral beliefs and behavioral intention. In the context of green marketing, previous studies have confirmed the mediation role of attitude (Su et al., 2021). For example, findings by Riskos et al. (2021) support the idea that attitude mediates the relationship between ecolabel credibility and ecolabel involvement. In a similar vein, Ha (2021) demonstrated that attitude mediates environmental concerns and green brand image.

The conceptual framework of the study is illustrated in Figure 1.



Source: own elaboration

3. Methodology

This study aims to assess greenwashing at the product level, with a focus on recycled toilet paper. This product is considered environmentally friendly, as it is biodegradable, bleach free, and uses paper pulp from sources other than wood, such as bamboo and wheat straw (Tushy, 2020). However, it is important to note that the consumption of ecological toilet paper in Portugal requires cutting down almost one million trees every year (Q. S. Supplies, 2022), as well as significant amounts of water (140 liters per roll) and energy (Skene, 2019).

To examine the proposed hypotheses illustrated in Figure 1, a quantitative methodology was employed. This method aims to explain the phenomenon in question using objective measures and statistical analysis of data collected through questionnaires (Bryman, 2016).

3.1 Measures

To obtain reliable results, a questionnaire was designed with measurement scales for each variable in the conceptual model. The use of questionnaires, as outlined by Bryman (2016), allows for the collection of information from a sample of individuals and is an effective



tool for describing and exploring behaviors. When necessary, adaptations were made to the scales, including translation into Portuguese and specific considerations related to the topic under study. The measurement scales were adapted from existing literature as follows:

The scale for measuring Perceived Greenwashing (PG) was adapted from Chen and Chang (2013), including 5 items (e.g., PG1: In eco-friendly toilet paper, words mislead as to its environmental characteristics). The Perceived Risk (PR) scale consisted of 5 items adapted from Pahlevi and Suhartanto (2020) (e.g., PR1: The ecological toilet paper puts my skin health at risk). The Willingness to Pay More (WPM) scale was measured with 4 items adapted from Wei et al. (2018) (e.g., WPM1: I would pay more for eco-friendly toilet paper). To measure Purchase Intention (PI), 4 items were adapted from Yazdanpanah and Forouzani (2015) (e.g., I am willing to purchase ecological toilet paper if it is available for purchase). Perceived Differentiation (PD) was adapted from Penz and Stöttinger (2008), and consisted of 87 items (e.g., PD1: Durability). The Attitude (ATT) was measured using scales previously developed by Spears and Singh (2004), comprising 8 items (e.g., ATT1: appealing/not appealing). Finally, to measure purchase behavior, participants were asked "When you bought toilet paper, how often did you buy ecological toilet paper?" with a "5-point Likert scale ranging from 1 (never) to 5 (always)". The questionnaire also included questions about the participants' sociodemographics for sample characterization. The questionnaire was pre-tested with 8 consumers to ensure clarity, and no modifications were deemed necessary.

3.2 Sampling

The participants of this study were Portuguese consumers who had purchased toilet paper at least once in the past year and were aged 18 or above. A convenience sampling technique was adopted, as the online questionnaire was shared through the researchers' social networks. Data collection took place between May 4th and June 3rd, 2022, resulting in 270 valid responses. The summary of the participants' demographics is presented in Table 1.

Table 1 - Demographics of the participants

Items	Frequency	Percent
Gender		
Male	79	29.3
Female	191	70.7
Age		
18-24	70	25.9
25-34	63	23.3
35-44	47	17.4
45-54	45	16.7
55-64	41	15.2
65 or more	4	1.5
Education		
1st cycle/4th year	1	0.4
2st cycle/6th year	3	1.1
3st cycle/9th year	10	3.7
Secondary Education/12th grade	70	25.9
Degree or Bachelor's Degree	107	39.6
Post-graduate	79	29.3
Occupation		
Employed	139	51.5
Self-employed	56	20.7
Student	42	15.6
Unemployed, retired, or housework	33	12.2
Monthly income		
Up to €500	23	8.5
Between €501 and €1000	81	30
Between €1001 and €1500	61	22.6
Between €1501 and €2000	23	8.5
More than €2000	23	8.5
Rather not say	59	21.9

Source: survey's data

4. Results and Discussion

4.1 Measurement Model Assessment

The SmartPLS3 v.3.3.9 software was used to evaluate the measurement and structural models. The results of the measurement model, presented in Table 2, reveal that the outer loadings for all constructs, except "ATT4", "PD5", and "PR1", exceeded the acceptable level of 0.6, demonstrating good model fit. Additionally, the values of "Cronbach's alpha" (α) and "composite reliability" (CR) were found to



be acceptable, with ranges of 0.827 to 0.965 and 0.814 to 0.965, respectively. The results also indicate strong convergent validity, as “average variance extracted” (AVE) values, were found to be above the suggested cut-off value of 0.50, ranging from 0.531 to 0.732.

Table 2 – Descriptive statistics (measurement model)

Constructs	Items	Loading Factor (> 0.6) (Chin, 1998)	α (> 0.7) (Hair Jr et al., 2021).	CR (> 0.7) (Hair Jr et al., 2021).	AVE (> 0.5) (Fornell & Larcker, 1981).
Attitude	ATT1	0.772	0.942	0.942	0.671
	ATT2	0.729			
	ATT3	0.797			
	ATT5	0.879			
	ATT6	0.972			
	ATT7	0.684			
	ATT8	0.812			
Perceived differentiation	PD1	0.691	0.896	0.895	0.551
	PD2	0.632			
	PD3	0.831			
	PD4	0.851			
	PD6	0.795			
	PD7	0.722			
Perceived greenwashing	PG1	0.732	0.895	0.890	0.624
	PG2	0.797			
	PG3	0.737			
	PG4	0.663			
	PG5	0.983			
Perceived risk	PR2	0.911	0.827	0.814	0.531
	PR3	0.574			
	PR4	0.755			
	PR5	0.628			
Willingness to pay more	WM1	0.997	0.914	0.913	0.732
	WM2	0.989			
	WM3	0.636			
	WM4	0.742			
Purchase intention	PI1	0.929	0.965	0.965	0.874
	PI2	0.954			
	PI3	0.933			
	PI4	0.923			
Purchase behavior	PF	1	-	-	-

Source: survey’s data

Furthermore, Table 3 shows that the heterotrait-monotrait (HTMT) ratios were all below the suggested cut-off value of 0.85, demonstrating good discriminant validity (Henseler et al., 2015). Overall, the results of the measurement model provide evidence of its reliability and validity, supporting its use in the study.

Table 3 – HTMT ratios for discriminant validity

Constructs	1	2	3	4	5	6	7
1. Attitude							
2. Perceived differentiation	0.285						
3. Perceived greenwashing	0.321	0.07					
4. Perceived risk	0.436	0.309	0.28				
5. Purchase behavior	0.482	0.241	0.061	0.285			
6. Purchase intention	0.71	0.353	0.179	0.361	0.551		
7. Willingness to pay more	0.546	0.211	0.094	0.187	0.433	0.575	

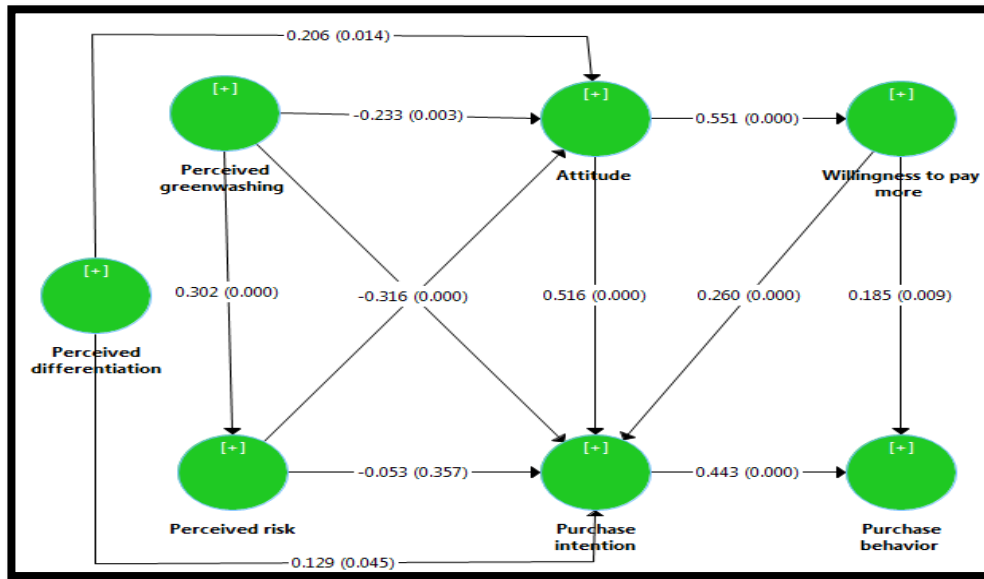
Source: SmartPLS output based on the survey’s data

4.2 Structural Model Assessment and Hypothesis Testing

The testing of hypotheses is summarized in Figure 2. The significance of path coefficients was assessed using the Consistent PLS bootstrapping resampling procedure with 5000 subsamples. To evaluate the structural model, the following aspects were considered: “multicollinearity (using variance inflation factor (VIF), coefficient of determination (R^2), and Q^2 predictive relevance”, as recommended by Hair Jr et al. (2021).



Figure 2 – Structural model



Source: SmartPLS output based on the survey’s data

The results, presented in Table 4, indicated that there were no issues with multicollinearity in the structural model, as all dependent constructs had VIF values lower than 5.0. The predictive relevance of the model was evaluated through R-square (R2) and cross-validated redundancy (Q2). R2 represents the level of variance explained by the exogenous constructs for the endogenous constructs. According to Cohen (1988), “R2 values of 0.02, 0.13, and 0.26” indicate weak, moderate, and substantial levels of predictive relevance, respectively. The results showed a weak R2 value for Perceived risk (0.092), and substantial R2 values for Willingness to pay more (0.304), Attitude towards eco-friendly products (0.277), Purchase intention (0.583), and Purchase behavior (0.326). Q22 values greater than zero (Chin, 1998) indicate the path model's predictive relevance for the dependent variable. The results of the present study showed that all Q2 values were larger than zero.

Table 4 – Summary of hypothesis test

Direct paths		Beta	T Values	P Values	Results	VIF
H1.	Perceived greenwashing → Attitude	-0.233	2.955	0.003	Accepted	1.127
H2.	Perceived greenwashing → Purchase intention	0.016	0.302	0.763	Rejected	1.211
H3.	Perceived greenwashing → Perceived risk	0.302	5.222	0.001	Accepted	1.000
H4.	Perceived risk → Attitude	-0.316	4.467	0.001	Accepted	1.240
H5.	Perceived risk → Purchase intention	-0.053	0.921	0.357	Rejected	1.383
H6.	Perceived differentiation → Attitude	0.206	2.460	0.014	Accepted	1.129
H7.	Perceived differentiation → Purchase intention	0.129	2.008	0.045	Accepted	1.195
H8.	Attitude → Willingness to pay more	0.551	10.991	0.001	Accepted	1.000
H9.	Willingness to pay more → Purchase intention	0.260	4.042	0.001	Accepted	1.466
H10.	Willingness to pay more → Purchase behavior	0.185	2.614	0.009	Accepted	1.514
H11.	Attitude → Purchase intention	0.516	6.033	0.001	Accepted	1.882
H12.	Purchase intention → Purchase behavior	0.443	6.790	0.001	Accepted	1.514
Endogenous variables		R Square		Q ²		
Perceived risk		0.092		0.039		
Willingness to pay more		0.304		0.206		
Attitude		0.277		0.171		
Purchase behavior		0.326		0.298		
Purchase intention		0.583		0.485		

Source: SmartPLS output based on the survey’s data



The results presented in Table 4 indicate a negative impact of perceived greenwashing on attitudes (H1: $\beta = -0.233$, $p < 0.01$), supporting H1 and consistent with the suggestions of Chang and Hung (2023). Additionally, this study found a significant positive impact of perceived greenwashing on perceived risk (H3: $\beta = 0.302$, $p < 0.01$). Hence, the findings are consistent with previous studies which have shown that greenwashing has a direct and positive impact on perceived risk and a negative impact on consumers' attitude and purchase intention (Lu et al., 2022; Nguyen & Dekhili, 2019; Tarabieh, 2021), which supports hypothesis H3. The relationship between perceived risk and attitude towards eco-friendly products was found to be significant and negative, thus providing support for hypothesis H4 (H4: $\beta = -0.316$, $p < 0.01$), which is in line with findings from previous studies (Chen & Chang, 2013; Tarabieh, 2021).

However, the effect of perceived greenwashing on purchase intention (H2: $\beta = 0.016$, $p > 0.05$) was not significant, thereby failing to support hypothesis H2. These results contradict previous studies (Apaolaza et al., 2023; Nguyen et al., 2019; Sun & Shi, 2022; Tarabieh, 2021), and suggest that the impact of perceived greenwashing on purchase intention is indirect, i.e., mediated by consumer attitudes. Similar to perceived greenwashing, perceived risk also had a non-significant direct impact on purchase intention (H5: $\beta = -0.053$, $p > 0.05$), failing to support hypothesis H5 and contradicting previous studies (Chen & Chang, 2013; Lu et al., 2022; Tarabieh, 2021). Again, the findings point to indirect effects of perceived risk on purchase intentions, through consumer attitudes.

This study also supports hypothesis H6, revealing that perceived differentiation has a significant positive effect on attitude (H6: $\beta = 0.206$, $p < 0.05$). This is in line with findings by Tseng and Hung (2013). The results also indicated a positive effect of perceived differentiation on purchase intention, thereby supporting hypothesis H7 (H7: $\beta = 0.129$, $p < 0.05$) and previous studies (Drugova et al., 2020). In line with extant literature (Li et al., 2018), hypothesis H8 was also confirmed, as the study found a positive effect of attitude on willingness to pay more (H8: $\beta = 0.551$, $p < 0.01$). Furthermore, also aligned with prior research (Varah et al., 2020), the results provide support for Hypotheses H9 and H10, revealing that willingness to pay more has a significant positive impact on purchase intention (H9: $\beta = 0.260$, $p < 0.01$) and purchase behavior (H10: $\beta = 0.185$, $p < 0.01$).

Finally, the study found a significant main effect of attitude towards eco-friendly products on purchase intention (H11: $\beta = 0.516$, $p < 0.01$), thereby supporting hypothesis H11. The relationship between purchase intention and purchase behavior was found to be positive and significant (H12: $\beta = 0.443$, $p < 0.01$), thus providing support for hypothesis H12. These findings are consistent with the conclusions from previous studies (Chang & Hung, 2023; Gleim et al., 2023; Zhuang et al., 2021).

In addition to direct effects, we examined the mediation role of attitude (see Table 5). The results indicated that the indirect effect of greenwashing ($\beta = -0.120$, $p < 0.05$), perceived risk ($\beta = -0.163$, $p < 0.01$), and perceived differentiation ($\beta = 0.106$, $p < 0.05$) on purchase intention through attitude is significant. Furthermore, the results also indicated that the indirect effect of perceived risk ($\beta = -0.174$, $p < 0.01$) and perceived differentiation ($\beta = 0.113$, $p < 0.05$), and willingness to pay more through attitude are significant.

Table 5 – Indirect effects

Indirect paths	Beta	T Values	P Values	Results
Perceived greenwashing → Attitude → Purchase intention	-0.120	2.480	0.013	Sig.
Perceived risk → Attitude → Purchase intention	-0.163	3.447	0.001	Sig.
Perceived differentiation → Attitude → Purchase intention	0.106	2.142	0.032	Sig.
Perceived risk → Attitude → Willingness to pay more	-0.174	4.178	0.001	Sig.
Perceived differentiation → Attitude → Willingness to pay more	0.113	2.374	0.018	Sig.

Source: SmartPLS output based on the survey's data

5. Conclusions

This article addresses the limited understanding of how greenwashing affects consumer behavior. It examines the impact of consumers' perceived greenwashing on their purchasing behavior of eco-friendly products, using the theory of planned behavior and the theory of perceived risk as theoretical underpinnings. Overall, the effect of perceived greenwashing on consumers' behavior of eco-friendly products was found to be only indirect, as the impact of perceived greenwashing on purchase intention and behavior was mediated by attitude.

5.1 Theoretical Implications

The article contributes to the literature on greenwashing and eco-friendly products by combining the Theory of Planned Behavior (TPB) and the Theory of Perceived Risk (TPR), providing a more comprehensive perspective of the phenomenon. The study findings highlight the role of perceived risk in the adoption of eco-friendly products, confirming that perceived risk has a detrimental effect on consumers' attitude towards eco-friendly products, as hypothesized. The additional role of willingness to



pay more and perceived differentiation was also found particularly relevant to extend the TPB model and further explain consumer attitudes, intention, and behavior.

Aside from the empirical findings, the comprehensive theoretical model that integrates several determinants of consumer behavior is another contribution of this article, which can be applied to other research contexts related to green, eco-friendly, and environmentally responsible products.

Furthermore, this article contributes to the existing literature review on the effects of consumer perceptions on attitudes and intentions. The non-significant effect of greenwashing (H2) and of perceived risk (H5) on purchase intention suggests that those impacts are mainly manifested through attitudes, which, as postulated by the TPB, are the main determinant of consumer intentions. Hence, the findings of this study align with the TPB, which proposes that attitudes are a critical mediator of the relationship between beliefs and behavior. Moreover, it provides an interesting contribution to the literature on greenwashing and eco-friendly products, by suggesting that the relationship with purchase intention is only indirect, through attitude.

5.2 Practical Implications

The findings of this study are particularly relevant for companies offering green, eco-friendly, and environmentally responsible products. Overall, the findings highlight the importance of addressing consumers' perceived greenwashing by providing transparent and credible information about eco-friendly products.

Considering the negative influence of perceived greenwashing and perceived risk on consumer attitudes and the indirect effect of perceived greenwashing and perceived risk on purchase intention (via consumer attitudes), it is crucial that companies adequately communicate the features of their eco-friendly products, in order to mitigate greenwashing and risk perceptions. Additionally, the differentiation of those products from their less sustainable alternatives should be highlighted, as perceived differentiation can help improve attitudes and purchase intentions.

Despite the potential economic benefits of developing sustainable products, it needs to be accompanied by effective marketing strategies to promote these products, gain consumers' trust, and overcome the negative perceptions that they often generate.

5.3 Limitations and Future Research Directions

The limitations of this study are as follows. First, the sample mainly consists of young consumers with medium and low incomes, who were recruited through a convenience sampling method. Therefore, the sample is not representative of the population and the results may not be generalizable to other age groups or high-level income groups. Additionally, this study was conducted in a single country thus the findings may not be applicable to other cultural contexts. Data was collected in one single calendar year (2022), which does not enable us to explore the possible dynamics of this phenomenon that may evolve over time. As such, it is recommended that future research conducts similar studies in other countries and cultures, including comparative studies and developing countries. Longitudinal studies and cross-sectional sampling can also provide relevant contributions in grasping the dynamics of the phenomenon. It is also recommended that other eco-friendly products be considered in future research, including both personal and public consumption items. Finally, the comprehensive model developed for this study can also be adapted to study additional moderator and mediator variables, such as consumer characteristics, and social influence.

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Credit author statement

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