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The hidden reasons behind generation Z's green choices

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Abstract
The green purchasing decision has become an increasing research focus, reflecting consumers' growing commitment to sustainability. Generation Z consumers are recognised for their greater environmental and social awareness than other generations. Although their inclination towards sustainability issues is well known, few studies are dedicated to the green purchasing behaviour of the individuals of this generation. Therefore, the primary purpose of this study is to explore and analyse the antecedents of Generation Z's green purchasing decision in Portugal. Thus, based on a sample of young Portuguese Generation Z and using the Partial Least Squares method, this study tested hypotheses concerning five antecedents of the green purchasing decision. Although unbalanced, the study results reveal that all the factors analysed are antecedents of the green purchasing decision. First, green willing purchase and environmental concern stand out as main antecedents. Next, factors related to perceived quality and benefits take the lead. The least essential antecedent concerns the predisposition to a change in purchase behaviour if the product's price is the same or lower than the standard product. This study contributes to under-explored literature on green consumption behaviour, especially among young people. In addition, it contributes to the development of knowledge about the antecedents of Generation Z's green purchasing decision in Portugal.

Keywords Green purchase decision · Generation Z · Green behaviour

1 Introduction

In recent years, global environmental degradation has significantly impacted human health and well-being [1–3]. This decline in ecological quality results from the overuse of natural resources driven by human activities, affecting society at large, including industries, governments, and research institutions [4, 5]. In response, consumer preferences are shifting toward environmentally friendly products as awareness of ecological concerns grows, leading to a shift in consumer behavior that favors sustainable and ethical choices [6–8]. Consequently, this trend has garnered increasing interest from organizations, scholars, and governments aiming to understand and address the motivations underlying green purchasing behaviors [1, 2].

The urgency of promoting sustainable consumer behaviors is underscored by pressing environmental challenges like climate change, which exacerbate issues such as global warming, natural disasters, and biodiversity loss. Among younger generations, particularly Generation Z, there is a notable commitment to sustainability. For instance, a recent

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study found that approximately 85% of young Europeans prioritize sustainable choices, including those in Portugal, who show a similar tendency [9]. Portugal's context in promoting sustainable consumer behavior among Generation Z is unique and distinguished by both cultural and socio-economic factors. The urgency for sustainable actions in Portugal is particularly pronounced due to its geographical vulnerability to climate change impacts [10]. With a coastline highly susceptible to rising sea levels, increased risk of droughts, and intensified forest fires, Portugal experiences firsthand the accelerating effects of environmental degradation [11, 12]. This direct exposure to climate-related events has heightened public awareness and made environmental sustainability a priority across all sectors, especially among younger generations. What's more, 75% of Generation Z consumers are inclined to pay more for products that align with their ecological values [13]. Known as the "climate change generation," these individuals increasingly align their purchasing behaviors with environmental principles, creating a demand for companies to adopt and promote sustainable practices. This shift not only influences corporate practices but also supports economic growth within the green sector, fostering job creation in eco-friendly fields [14, 15].

Despite this broad interest in sustainable consumption, there is still a substantial gap between consumers' expressed intentions and their actual purchasing behaviors, a phenomenon termed the "intention-action gap" [16, 17]. Research indicates that this gap persists across generations, with notable variations by age. For example, although younger consumers like Gen Y and Z are widely seen as more environmentally conscious, studies reveal that older generations may be more consistent in translating environmental values into concrete actions [18]. Addressing this gap is critical to designing effective strategies that foster sustainable purchasing behavior, particularly within Generation Z, which will play a leading role in future environmental and economic spheres [15].

An body of research has examined green consumer behavior across different cultural contexts, revealing a diverse range of consumer attitudes and practices. Some studies address green consumer behaviour in different contexts, individually, such as Italy [19], Spanish [20], Iran [6], Canada [21], Philippines [22], United Kingdom [23], Malaysia [24], United States [25], China [26], Chile [27] and India [28–30]. Some studies make comparisons between different contexts, such as Croatia and Sweden [31], China, Taiwan, and India [32], England, Germany, Portugal, and Spain [33], and England and Portugal [34, 35]. Paco, Alves, Shiel and Filho [33] presented a model to test the relationships between environmentally friendly purchases, conservation behaviour, environmental concern, generativity (concern for the future), and human-nature orientation. Paco, Shiel and Alves [34] examine the antecedents of purchasing behaviour (green communication, value given to green, prosocial attitude), suggesting a model of behaviour related to the green consumer. Shiel, Paco and Alves [35] analyses generativity in relation to green consumption. As well as including the differences between Portugal and the UK, it also takes into account age and gender. The authors claim that regarding generativity there are no differences between countries or gender. On the other hand, age is an influencing factor [35]. Ham, Chung, Kim, Lee and Oh [18] delved into the links between consumers' green attitudes and purchase intentions across four generations: Baby Boomers, X Generation, Y Generation, and Z Generation. The results of their study disclosed a variation between green convictions and values according to the age of the individuals. Despite the widespread belief that younger folks, especially Gen Y and Z, are keener to protect the environment, the investigation by Ham, Chung, Kim, Lee and Oh [18] showed the antithesis: older generations pull more weight when it comes to following social and personal norms of green consumption and show more willingness to patronise green firms.

However, there remain significant gaps in the literature regarding Generation Z's unique preferences and motivations for green consumption. Specifically, while research has highlighted factors influencing sustainable behavior, few studies have examined how antecedents like green-consciousness price, perceived benefits, and perceived quality specifically shape Generation Z's green purchase decisions [36–38]. Additional gaps involve understanding how these young consumers balance ecological concerns with price sensitivity, given that Generation Z has experienced financial instability from events like the COVID-19 pandemic, military conflicts, and economic downturns, making cost considerations particularly relevant [15, 18]. Addressing these gaps is essential to crafting strategies that resonate with Generation Z's unique perspectives and can effectively narrow the intention-action gap.

To address the identified gaps, this study formulates the following research question: How do green purchasing antecedents, including green willingness to purchase, green-consciousness price, green perceived benefits, and green perceived quality, influence Generation Z's green purchasing decisions in Portugal? The primary objective of this research is to conduct an in-depth analysis of the factors shaping Generation Z's green consumption behaviors in Portugal. By examining these antecedents, the study aims to clarify the unique attributes of this generation's sustainable decision-making process and to contribute to a deeper understanding of the broader determinants influencing green consumption among young consumers. The findings of this study are expected to provide insights into how Generation Z's values

and priorities can inform effective green marketing strategies. Through a quantitative methodology, 708 responses were collected from Generation Z in Portugal.

This study makes five key contributions that enhance the understanding of green purchasing behavior and inform both theoretical and practical approaches to sustainable marketing. First, it fills existing gaps in knowledge regarding the antecedents of Generation Z's green purchasing decisions, particularly in the Portuguese context, thereby providing region-specific insights that support tailored marketing strategies. Second, the study identifies a positive relationship between the willingness to purchase green products and actual purchasing decisions, suggesting that this intention significantly influences Generation Z's choices. Third, it establishes a hierarchy of antecedents, with willingness to buy green as the most influential factor, followed by perceived quality and perceived benefits. This finding underscores the need for marketing strategies that emphasize product quality to effectively engage young consumers. Fourth, the study reveals an unexpected trend: although Generation Z values financial stability, the green-consciousness price has a comparatively minor influence on their purchase decisions. This insight challenges common assumptions and suggests that, for this demographic, green products may be viewed as worthwhile investments rather than mere expenditures. Consequently, companies could benefit from positioning green products as high-value, long-term purchases for Generation Z consumers. Finally, the research provides concrete recommendations for businesses, emphasizing the importance of product differentiation with a focus on quality, as well as clear communication of the benefits associated with sustainable purchases. This approach not only helps deepen the understanding of Generation Z's motivations but also offers actionable guidelines for integrating sustainable practices into marketing strategies.

2 Literature review

Environmental concerns and green product purchases are among the most actual issues, mainly among Z Generation consumers. However, these consumers frequently keep purchasing harmful products due to some tradeoffs that green products involve, such as higher prices, less performance, lower quality, and lower convenience. Price, quality, and advantages continue to be the main deciding factors in green consciousness. There has been some research on consumers' intentions to make green purchases such as Mishra and Kulshreshtha [39], Arora and Manchanda [40], Ansu-Mensah [41] and Dangelico, et al. [42].

Consumers' demand for green products has become a broad investigation and commercial development field. Therefore, companies have also shown some concern for environmental protection and are striving to achieve a green economy. In order to satisfy customer preferences and realize long-term economic benefits, marketing strategies are modified in response to shifting consumer preferences for green products and real environmental issues [42]. However, according to Rex and Baumann [43], despite available data, the purchase rate for green products remains quite low. This is partially due to the fact that changes in customers' intents to purchase eco-friendly products—which are directly related to their understanding of environmental issues and eco-friendly products—have an impact on the market's growth.

Within the literary domain, the notion of purchase intention is frequently seen as a crucial element in stimulating and incentivizing customers to acquire goods and services. According to Chen and Chang [44], green purchase intention refers to the inclination of consumers to opt for environmentally friendly products. Consumers choose green products as a means to contribute to environmental protection [45]. Measuring green purchase intention is crucial for understanding consumer decisions regarding eco-friendly products and for predicting the demand for such products.

2.1 Green willing purchase and green purchase decisions

Temizkan [46] demonstrates how environmental values have a major positive impact on people's attitudes and intentions about green consumption. Green purchasing behavior is favorably and significantly impacted by the intention to purchase green items. According to Ansu-Mensah [41], green products are typically associated with reduced carbon emissions, energy efficiency, recyclability, and health. An explanation for the goal to make green purchases is a preference for eco-friendly goods. Customers expect information on green products and quality since they are thoughtful about the products they buy.

The relationship between consumer awareness of green products and their environmental impact objectives is significant, as highlighted by various studies. Nguyen, et al. [47] suggest that consumers who are conscious of the performance of green products are better able to meet their environmental impact objectives. This indicates that awareness and understanding of the benefits and functionalities of green products play a crucial role in shaping consumer

decision-making. Mishra and Kulshreshtha [39] further support this idea by confirming that both the experience of using green products and their perceived environmental friendliness significantly motivate consumers to purchase these products. Their research indicates that the more familiar and positive experiences consumers have with green products, the more likely they are to consider and choose these products in the future.

Numerous studies have demonstrated the importance of the relationship between consumer awareness of green products and their environmental effect objectives. According to Nguyen, Nguyen and Hoang [47], customers are more likely to achieve their environmental impact goals when they are aware of how green products perform. This suggests that consumers' decision-making is significantly influenced by their knowledge of and comprehension of the features and advantages of eco-friendly items. This theory is further supported by Mishra and Kulshreshtha [39], who affirm that consumers are highly motivated to buy green products because of their perceived environmental friendliness as well as their personal experience utilizing them. According to their research, consumers are more inclined to think about and select green products in the future if they have more pleasant and familiar encounters with them. The perceived environmental advantages of green products are also a significant factor in purchasing decisions. Considering this, this study aims to explore the following research hypothesis:

H1 Green willing purchase positively influences Generation Z products' green purchase intention.

2.2 Green awareness price and green purchase decisions

When it comes to sustainable purchases, cost is essential. Externalities like pollution that arise from producing a product are often disregarded in the product's final price or production cost. This calls for a change in consumer behaviour, and increasing prices of sustainable products can be an effective incentive [48]. The idea that externalities are vital to incorporate into a product's final price is supported by Pomering [49]. Consumers who prioritise sustainability recognise that products and services have an extra social and environmental worth, leading them to pay more. A business that strategically integrates eco-friendly attributes into its products while keeping costs down will gain a competitive edge over other companies [50]. Arora and Manchanda [40] investigated the function of a favorable attitude toward sustainable clothing in moderating the association between green perceived value and purchasing intention among Generation Z. The intention to buy sustainable clothing, good attitudes about sustainable clothing, and perceived value of greenery were found to be significantly correlated by the researchers.

According to Laroche, et al. [51], individuals are willing to pay more for sustainable items. According to Zeynalova and Namazova [52], green awareness, purchase intentions, and behaviors toward eco-friendly products are also important elements. Green goods are generally more expensive than conventional options (Yang, et al. [53]. Furthermore, Dangelico, Nonino and Pompei [42] discovered that there was no evidence to support the idea that there would be a relationship between environmental concern and a willingness to pay a higher price. Prayoga, et al. [54] draw attention to how customer purchase decisions are influenced by green consciousness. Because they need more work to manufacture, green products are usually more expensive and less appealing to consumers. Customers are prepared to pay extra for environmentally friendly products provided they are well-made, affordably priced, and readily [55].

As highlighted in Mehmood and Bhaumik [56], green pricing and green promotion can influence consumer buying behavior (CBB) by providing environmentally friendly products at competitive prices. Green pricing and promotion have a positive and significant association. Cheng, et al. [57] consider green price awareness an important motivational factor for consumers' purchase behavior. Intention is the precursor of behavior and, therefore, its best predictor.

Hu, et al. [58] state that consumer attitude, intention, and green psychological benefits significantly affect their willingness to pay premium prices for green products. In addition, the indirect effects of consumer attitudes toward organic food and intention to consume in the relationship between the factors and willingness to pay premium prices provide exciting findings.

Ling [59] also refers to the higher price of green products because of the higher cost incurred in the manufacturing chain. Price is a significant component to consumers, and many consumers don't make a green purchase due to the price [55]. Ansu-Mensah [41] argues that the price is irrelevant to green purchase intentions. What is essential is the price fairness of green products because it will boost consumers' perceived value and purchasing intentions. It seems there isn't a total consensus about the impact of the green awareness price on green purchase decisions, so it would be essential to develop further research on new generations like Generation Z.

Considering this, this study aims to explore the following research hypothesis:

H2 Green price awareness positively influences Generation Z products' green purchase intention.

2.3 Green perceived benefits and green purchase decisions

Due to global threats such as environmental disasters, climate change, and global warming, consumers are actively engaging in sustainable consumption and ecological behaviour [60]. This shift toward sustainability may impact human behaviour favorably [61, 62]. More people than ever are interested in eco-friendly goods as green consumption becomes a social norm in which consumers prioritise the environmental impact of products for the present and future generations [16, 63, 64]. Schuitema and de Groot [65] suggested that collectivism appears to be a favorable aspect for those opting for green purchases. This outlook considers the present, the upcoming generations, and the environment.

Furthermore, the literature [66–68] reveals that there are correlations between green perceived value and customer attitude. This also leads us to the conclusion that customers' favorable sentiments toward sustainable products would likewise be considerably shaped by green perceived value [40].Studies show that consumers—especially those belonging to Generation Z—are growing more environmentally aware and are prepared to pay more for goods that adhere to environmental regulations [55]. In light of this, the purpose of this study is to investigate the following research hypothesis:

H3 The green perceived benefits positively influence Generation Z products' green purchase intention.

2.4 Green perceived quality and green purchase decisions

Zeynalova and Namazova [52] highlight consumer attitudes and behaviours toward ecologically friendly products, concluding that consumers value the quality of green products, like how they are produced (naturally), recyclable capability, green-labeled with no dangerous chemicals, and reliable products. Also, Banerjee [69] identified a positive relationship between consumers who care about the environment and immediate and tangible benefits (green perceived benefits). Bhavana and Thiruchanuru [55] refer to the importance of the environmental issues among Generation Y and Z and briefly review how environmentally conscious Generation Y and Generation Z respond to different factors, such as price and quality effects, that influence their purchase behaviour patterns. Quality and green product reliability are essential [41]. Consequently, if consumers anticipate an excellent quality of green products, it will become a relevant element that impacts their green purchasing intentions.

Some literature has shown that customers who prioritize environmentally friendly options also prioritize quality and price. This theory of consumer value considers various factors, such as utilitarian and functional values, which impact green product selection [70, 71]. Recent research by Dangelico, Nonino and Pompei [42] provides evidence that higher levels of functional value in green products result in greater satisfaction and more frequent purchases. Considering functional value as a product quality attribute, green perceived quality is a vital precursor to making green purchase decisions. Current research also shows that younger generations perceive such utilitarian value more significantly than older generations [18]. All these factors together lead us to the need for further research on the younger generation, and we will focus on Generation Z. Considering this, this study aims to explore the following research hypothesis:

H4 The green perceived quality positively influences Generation Z products' green purchase intention.

2.5 Environmental concerns and green purchase decisions

Customers' environmental awareness and sensitivity are increased by their environmental knowledge and concern [46]. However, Temizkan [46] study—which looked at 450 university students who would be Generation Z representatives in Turkey—found that views toward green consumption and environmental values do not significantly influence green buying behavior. Environmental awareness is the comprehension and cognition of the environment and environmental protection, according to Shi and Jiang [72].

According Dangelico, Nonino and Pompei [42], an innovative model that emphasizes the positive effects of green practices and creativity on creating satisfaction with green purchases was created. As individuals begin to embody eco-friendly habits daily, purchasing environmentally conscious products will likely be more satisfying as they coincide with their established green behaviour. Some literature has explored the connection between eco-friendliness and favorable attitudes toward the environment environmental and conduct, with environmental concerns serving as a significant precursor [73, 74]. As reported by Lee, Kim, Kim and Choi [74] and Alzubaidi, Slade and Dwivedi [73],

environmental concerns positively influence green purchases. According to Testa, Iovino and Iraldo [19], among other earlier research, environmental concern is an antecedent that favorably and indirectly influences consumers' purchasing decisions. Of particular relevance is the circular packaging hypothesis. Additionally, Mostafa [63] notes that environmental concerns positively affect consumers' intention to buy green products and their purchase frequency. Considering this, this study aims to explore the following research hypothesis:

H5 Environmental concerns positively influence Generation Z products' green purchase intention.

A conceptual model was developed based on the literature review (Fig. 1).

3 Methods

3.1 Sample

Between September and December 2023, an online questionnaire with a link posted on the author's social media accounts (Linkedin and Facebook) and authors' email contact lists were used to collect the sample for this study. Therefore, this is a non-probabilistic sample, collected for convenience. All participants provided informed consent, and the questionnaire was anonymous. Fifteen individuals took part in a pre-test to gauge their comprehension of the questions and the typical time it took to respond. The pre-test findings showed that participants answered the questions correctly on average, taking five minutes and that they had no qualms about how to understand them.

The target audience for this questionnaire is young Portuguese people from Generation Z who usually consume green products. We performed two filters on the sample from the questionnaire. The first filtering resulted from the answer to the first question of the questionnaire that aims to evaluate the consumption of green products: Do you have a habit of purchasing green products? (Yes or no). To answer this question, the definition of green products was presented. Participants who answered no finished the questionnaire. Then, based on participants' responses regarding age, we filtered the sample by young Portuguese Generation Z, born between 1995–2010. Thus, of the 927 responses obtained from consumers of green products, 708 participants are young people from Generation Z who regularly consume green products. In Portugal, according to data from Pordata [75], around 1.1 million young people belong to Generation Z. If we consider an error term of 3% and a confidence level of 95%, 1,067 responses would be needed, with fewer responses being obtained. Considering the sample size of the target audience and the fact that the sample is not probabilistic, it is not representative.

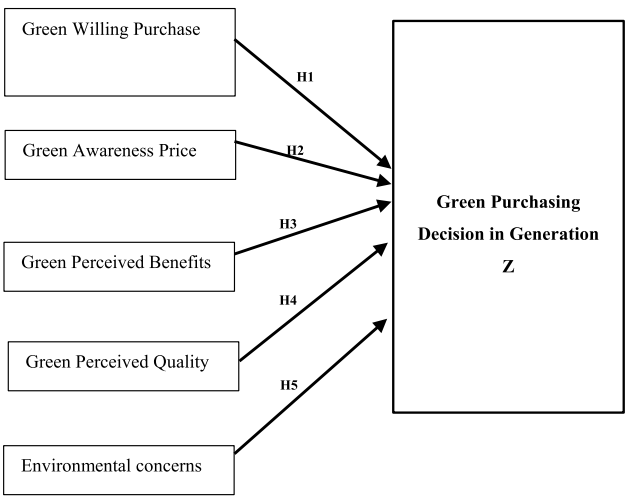

Fig. 1 Structural investigation model

3.2 Data measurement

A adapted version of the survey was taken from Nekmahmud and Fekete-Farkas [76]. There are seven categories of questions in the questionnaire, some of which deal with the individuals' sociodemographic profile.

The first group is related to the green purchasing decision measured by four items. The second group is associated with the green willingness to purchase measured by two items. The third group of questions assessed the green awareness of price measured by two items. The fourth group is concerned with perceived green benefits measured by two items. The fifth group of questions assessed green perceived quality measured by three items. The sixth group is related to environmental concerns measured by four items. The description of the items that measure each construct is found in Appendix A.1. Every response was evaluated using a 5-point Likert agreement scale, with 1 denoting strongly disagree and 5 denoting strongly agree.

3.3 Data analysis

Data analysis was carried out in six steps. Firstly, a statistical analysis of the items included in the structural model was carried out using the SPSS software (v.25). In the second step, multiple linear regressions were estimated to evaluate the statistical association of sociodemographic characteristics with the dependent variable of the green purchasing decision structural model. In the third step, a factor analysis was carried out, and an Exploratory Factor Analysis (EFA) was implemented to divide the items into factors and a Confirmatory Factor Analysis (CFA) to evaluate the confirmatory factor loads and the reflective nature of the structural model. In the fourth step, the algorithm Partial Least Squares (PLS) method was applied to the structural model and the Smart PLS3.0 software [77] was used to explore the relationships between the variables established by the formulated hypotheses. Since the information was gathered via surveys, an SPSS data normalcy test (kurtosis and skewness statistics) was conducted, and the results showed that the information was not distributed normally. The PLS method proved appropriate for our research because it does not require data normality and allows for maximizing the relationship between the gathered indicators and the constructs created by these latent indicators [78]. The model that was obtained in the fifth step after applying the PLS method was assessed using the measures suggested by [78] for convergence, reliability, and discriminant validity: (i) Cronbach's Alpha measurements ($C\alpha > 0.70$); (ii) composite reliability ($CR > 0.70$); (iii) Average Variance Extracted ($AVE > 0.50$); and (iv) discriminant validity tested using the Fornell-Larcker criterion. In the final step, a bootstrapping study was performed to estimate the relationships between the constructs described in the structural model using the Smart PLS software.

4 Results

4.1 Descriptive analysis

First, a sociodemographic characterization of the participants was carried out. The sample of this study contains 708 responses. As in other studies on the consumption of green products [79, 80], most respondents who consume green products are women (63.4%). They have an average age of 20.5 years (maximum age 26 years and minimum age 16 years). Participants are primarily students (69.6%), and, as such, 56.7% have completed the 12th year. Consequently, the net monthly income is mainly low (67.3%), i.e. up to €665.

The statistical relationship between sociodemographic traits and the dependent variable of the structural model of green buying decisions was also assessed using multiple linear regressions. The findings (Table 1) show that gender

Table 1 Sociodemographic factors' statistical relationship with the dependent variable, green purchase decision

Variables	Gender		Age		Education		Professional situation		Monthly Net Income	
	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Green purchase decision	0.195	0.063	– 0.140	0.022	0.118	0.001	0.049	0.422	– 0.077	0.327

and the decision to make a green purchase have a favorable statistical relationship (β = 0.195). These results show that women are more likely to purchase green items and to have substantial environmental concerns than males because gender was categorized as a binary variable (0 = men and 1 = women). Age and green purchasing decisions are statistically negatively correlated (β = − 0.140). Younger women are, therefore,ore likely to purchase eco-friendly goods. Additionally, education is statistically positively correlated with making green purchasing decisions (β = 0.118). Younger people with greater education can purchase environmentally friendly goods [74, 81–83]. Professional occupation and monthly net income were not statistically significant to explain the green purchase decision.

Table 2 contains the standard deviation and means of the variables of the structural model presented. More respondents will likely concur that they typically purchase more environmentally friendly goods for themselves (M = 4.41) and prefer more green products than non-green products (M = 4.00). The availability of environmentally friendly items for purchase in Portugal is highly valued by them (M = 4.44), and they are willing to alter their consumption habits if the cost of environmentally friendly products is lower than that of non-green ones (M = 4.53) and prefer green products over non-green ones (M = 4.52). They consider green products to be good for health (M = 4.47), have acceptable quality (M = 4.25), and are reliable (M = 4.24). The environmental concerns most valued by Gen Z youth are the preservation of nature and wildlife (M = 4.53), and due to their environmental concerns, Gen Z youth are happy to buy green products (M = 4.32).

4.2 Factor analysis

The outcomes of applying CFA and EFA are shown in Appendix A.2. After employing EFA, the original items were dispersed over six factors, each corresponding to a construct found in the structural model. No items were left out. With no single factor accounting for more than 50% of the variance, the six factors have an aggregate variance of 59.2%. By using CFA, we determined that every item had high factor loadings (> 0.70), which supported the model's reflective character that was produced using the PLS approach.

Table 2 Statistical description of the items that measure the variables of the structural model

Variables and items	Mean	Standard deviation
Green Purchasing Decision (GPD)		
GPD1	4.00	0.948
GPD2	4.41	0.761
GPD3	3.54	1.081
GPD4	3.94	1.023
Green Willingness Purchase (GWP)		
GWP1	4.44	0.757
GWP2	3.54	1.085
Green Awareness Price (GAP)		
GAP1	4.52	0.730
GAP2	4.53	0.773
Green Perceived Benefits (GPB)		
GPB1	4.47	0.736
GPB2	3.94	1.012
Green Perceived Quality (GPQ)		
GPQ1	4.25	0.761
GPQ2	3.89	0.955
GPQ3	4.24	0.785
Environmental Concerns (EC)		
EC1	4.53	0.712
EC2	4.32	0.831
EC3	4.11	0.913
EC4	4.00	0.826

Table 3 Evaluation of the measurement model

	Cα	CR	AVE	GPD	GAP	GPB	GPQ	GWP	EC
Green Purchase Decision (GPD)	0.805	0.873	0.632	**0.795**					
Green Awareness Price (GAP)	0.760	0.893	0.806	0.451	**0.898**				
Green Perceived Benefits (GPB)	0.714	0.791	0.566	0.561	0.545	**0.752**			
Green Perceived Quality (GPQ)	0.762	0.855	0.747	0.573	0.483	0.702	**0.864**		
Green Willingness Purchase (GWP)	0.746	0.812	0.685	0.709	0.512	0.586	0.551	**0.827**	
Environmental Concern (EC)	0.797	0.867	0.622	0.631	0.452	0.579	0.561	0.595	**0.789**

AVE square root in bold

Table 4 Direct effects on green purchasing decision

Direct effects	Path (β)	*t-Value* (Bootstrap)	Confidence interval (2.5%; 97.5%)	Support
Green Purchasing Decision				
H1: Green Willingness Purchase (GWP)	0.461	4.646*	Sig (0.396; 0.521)	Yes
H2: Green Awareness Price (GAP)	0.004	0.155*	Sig (−0.051; 0.064)	Yes
H3: Green Perceived Benefits (GPB)	0.065	1.901*	Sig (0.000; 0.131)	Yes
H4: Green Perceived Quality (GPQ)	0.109	3.079*	Sig (0.033; 0.179)	Yes
H5: Environmental Concerns (EC)	0.256	7.257*	Sig (0.188; 0.329)	Yes

* $p < 0.001$

4.3 Evaluation of reflective measurement model

Hair, Risher, Sarstedt and Ringle [78] state that three measures should be used to assess the convergence and reliability of the PLS model obtained: Average Variance Extracted (AVE > 0.50), Composite Reliability (CR > 0.70), and Cronbach's Alpha (Cα > 0.70). The discriminant validity must be tested by the Fornell-Larcker criterion and the predictive prediction through the R^2 values of the endogenous latent variables. Table 3 displays the outcomes of these measures. The model is dependable and exhibits factor convergence since the outcomes surpass the reference values. Additionally, discriminant validity exists between the latent variables and the methods used to measure them in accordance with the outcomes of the Fornell-Larcker criterion.

4.4 Explanatory analysis

Additionally assessed were the GPD endogenous variable's R^2 (coefficient of determination) and the cross-validated redundancy approach's predictive relevance (Stone-Geisser—Q^2). As Q^2 is more significant than zero (Q^2 of the GPD = 0.361), the estimated PLS model is relevant to predicting the dependent variable GPD. The independent variables GWP, GAP, GPB, GPQ, and EC explain 58.2% of the variance of the dependent variable GPD ($R^2 = 0.549$). Considering the values obtained for the R^2, the independent variables used in the model have a "substantial effect" (Cohen, 1988). Finally, the model fits well (Chi-Square = 0.086; Goodness-of-Fit: 0.932; Comparative Fit Index: 0.942; Standard Root Mean Square Residual: 0.091). The estimation of the links between the constructs as desacribed in the structural model is displayed in Table 4.

Ordered by importance, the results present a positive relationship between green willingness to purchase (β = 0.461), environmental concerns (β = 0.256), green perceived quality (β = 0.109), green perceived benefits (β = 0.065), and green awareness price (β = 0.004) with the Green Purchasing Decision. In this way, Hypotheses 1 to 5 are confirmed. The green willingness to purchase is the most crucial determinant of the green purchasing decisions of the young people of Generation Z, followed by the environmental concerns, the green perceived quality, and the green perceived benefits. However, the green awareness price is the antecedent that least contributes to the green purchasing decision.

5 Discussion of results and implications

5.1 Discussion of results

This study investigates the impact of many antecedents on Portuguese Generation Z's decision to make green purchases. Our results supported all the hypotheses proposed in the literature review. The contribution of these antecedents is unbalanced, notwithstanding the positive relationship between the green buying choice and its antecedents (green willingness to purchase, green awareness price, green perceived benefits, green perceived quality, and environmental concerns). According to the results presented in Table 4, the green willingness to purchase is the antecedent that most influences the green purchase decision, followed by environmental concerns, green perceived quality, green perceived benefits, and green awareness price.

The rise of green willingness purchase as the most crucial antecedent in the sample means that the main driver for green purchase decisions is the positive inclination to buy products if they are available in the country, even at a higher price [23]. This means that Generation Z is inclined to buy sustainable products even if it means paying a higher price than they would for non-sustainable products [84]. On the other hand, green awareness price has the lowest importance for the green purchase decision among the antecedents studied according to the results in Table 4. This antecedent, in turn, analyses the predisposition for a change in purchase behavior if the product's price is the same or lower than the standard product. This suggests that even if green products are available at similar or lower prices than standard products, other factors such as environmental concern, quality and perceived benefits are more important in the decision to buy green products. Consequently, it appears that young Portuguese are more concerned with product sustainability and environmental impact than price, based on the antagonistic balances seen between wanting to pay for green products. Even if it means incurring extra costs, consumers are prepared to pay more for goods that they believe to be more sustainable. In fact, a recent study involving Generation Z individuals discovered that these customers place less value on pricing when worried about sustainability [85]. However, in developing countries where the price is a crucial factor, green awareness price seems to have a more substantial impact [76]. Furthermore, the importance of the green awareness price should not be overlooked as this factor can act as a mediator, enhancing the effects of environmental concerns, perceived quality, willingness to purchase, and perceived benefits on consumers' green purchasing decisions [86].

Regarding the environmental concern, as well as in previous studies both in developed and developing countries comprising different ages [1, 23, 34, 87], it is shown to be an important antecedent of the green purchase decision. According to the high exposure to information in social networks and online resources, generation Z displays a strong awareness of sustainability, as argued by some authors [88]. The direct exposure to climate-related events has also heightened public awareness and made environmental sustainability a priority, especially among younger generations.

Perceived quality of green products proves to be an essential factor for the green purchase decision, reflecting the perceptions of young Portuguese regarding acceptable quality, durability, and reliability. Indeed, previous studies have observed that Generation Z is more likely to consider green products of higher quality than individuals of other generations, which reveals the crucial utilitarian value for these consumers [18]. In recent studies, perceived quality has been shown to be a very relevant determinant of intentions to purchase different product categories, such as sustainable beer [89], sustainable biscuits [90], and clothing [91]. Finally, although less relevant, the importance of perceived green benefits in the purchase decision is noted. This antecedent reflects the importance of Portuguese Generation Z 's perceptions that green products suit their health. On the other hand, in a previous study that assessed the influence of this antecedent on the willingness to pay more for green products in the same context, it was found that the perception that these products are healthier or have a good taste and flavor is not a relevant antecedent [15].

Furthermore, the multiple linear regression to verify the statistical association of sociodemographic characteristics with green purchase decisions (see Table 1) indicated that more educated and female young people have a greater green purchase decision. The results contrast with the findings of a recent study in the same context. Older male Generation Z and those with less education had a larger tendency to pay more for green products, according to the analysis of willingness to pay more for green products [15]. Thus, while previous studies have shown that younger, less educated Generation Z males are the ones most willing to pay for green products, the results of our study show that more educated women are the ones with greater green purchasing decisions. Moreover, income did not emerge as a decisive factor for green purchasing decisions. A recent study conducted with Generation Z in the country revealed that while women have higher levels of education, men have higher income levels, which may explain the difference between the findings of the studies [92].

5.2 Theoretical implications

Different implications arise from this work from a theoretical standpoint. First of all, this study advances the field of sustainable consumer behavior research. As mentioned, there are increasingly more environmentally conscious consumers in the modern world, and companies increasingly encourage purchasing green products. Therefore, research to identify and explore the antecedents of buying green products in different consumer groups is crucial [6, 36]. More specifically, we contribute to the literature by studying an under-researched consumer group, namely Generation Z youth [40, 55, 85, 87]. This study extends the field of study on green purchase decision and its direct antecedents [86, 93], increasing understanding of the sustainable behavior of the Portuguese Generation Z population. Theoretical implications arise when studying the selected constructs in the Portuguese context, making possible the comparison with other contexts, for example, with regard to the importance of price awareness in developing and developed countries [76].

In addition, this study addresses the gaps concerning the constructs that have been analyzed, showing their unbalanced influence on Generation Z consumers' purchase of green products. The green willingness to purchase was found to be the most influential factor in green purchase decisions. This finding supports earlier research on green product prices [51]. Recently, Meet et al. (2024) showed that this factor was the most significant predictor of Generation Z's purchase intention towards eco-friendly packaged beverages in an emerging country. Therefore, our study reinforces this finding by highlighting that the positive inclination to buy products if they are available, even at a higher price, is also the main antecedent of Generation Z's green purchase decision in a developed country. Our results also aligned with previous studies that report that environmental concerns are strong antecedents of green purchase intention [1, 87]. Our research focused on Generation Z customers reinforces that this demographic group is deeply concerned about sustainability, emphasizing the significance of environmental concern in making green purchasing decisions [94].

The perceived benefits and perceived quality have been little studied in this demographic group [18, 42, 76]. Our results have therefore contributed to the field of knowledge by showing that these are important antecedents of sustainable consumption. While previous research have shown that the perceived benefit of green products is not relevant to the willingness to pay more for such products [15], this study shows that the perceived benefit is fundamental to the green purchasing decision.

Finally, the study's findings also provide another insight: the antecedent that has the least influence on consumers' decisions to buy green items is whether the price of a green product is the same as or less expensive than a non-green one. This is in line with Ansu-Mensah [41] who argues that what is essential is the price fairness of green products because it will boost consumers' perceived value and purchasing intentions, while the price is irrelevant to green purchase intentions.

5.3 Practical implications

In practical terms, this study also presents new insights. Firstly, the results of this study reveal that price is not the most important factor in Portuguese Generation Z's green purchase decision. In this sense, results suggest that awareness and education about environmental issues play a fundamental role in youth consumers' purchasing decisions, overcoming exclusively economic considerations. Generation Z consumers are strongly influenced by their willingness to buy green products, even at higher prices, favoring their environmental concerns, as well as factors such as quality and perceived benefits. This finding highlights that companies should focus on enhancing educational initiatives, both internally and externally, that foster a deeper understanding of their green product's value proposition among Generation Z [95]. This can include corporate social responsibility campaigns, public awareness programs, and the use of sustainability metrics in their branding strategies. This finding also indicates that in order to attract Generation Z, companies must ensure that their green products are widely available, regardless of price.

Secondly, given that it is argued that the digital environment is essential to disseminate information and reach consumers, especially those from Generation Z [88], companies and policy-makers should bet on digital presence in social networks and other communication channels with these consumers to make them increasingly aware and sensitive to environmental issues [87]. The second most relevant factor for the green purchasing decision among Portuguese Generation Z was environmental concern. This implies that firms must integrate storytelling about their

sustainability journey into their digital marketing strategies to establish a more profound emotional connection with Generation Z consumers. By emphasizing how their products contribute to larger global goals, such as combating climate change or reducing plastic waste, firms can deepen loyalty and trust among these consumers. Therefore firms can use these same channels to promote educational initiatives that raise awareness about climate change and sustainability to strengthen Generation Z's engagement in sustainable choices. Thirdly, companies may also use these channels to connect with the values and concerns of this specific target market while at the same time disseminating information about the quality and benefits of green products. This underscores the managerial need to invest in integrated marketing campaigns that not only highlight the superior quality of green products but also align them with the aspirational lifestyle choices of Generation Z. Partnerships with influencers [96], sustainability advocates, or content creators on platforms, such as Instagram and TikTok, can amplify this message. In fact, companies should bet on differentiating their products by offering higher quality green products. More importantly, companies must ensure that the quality and benefits of green products are effectively communicated to Generation Z consumers. From a managerial perspective, this means allocating resources to comprehensive marketing plans that underline how green products enhance personal and societal well-being. Firms should also leverage certifications and eco-labels to validate their claims and build credibility with discerning Generation Z consumers This means that businesses need to spend money on marketing plans that emphasize the products' quality as well as how they help people live more sustainably and benefit society and the environment. Green products can be positioned as wise investments by emphasizing their qualities and advantages, which will allow them to be sold for more money than non-green items [15]. As mentioned, this communication can be done through digital channels or product certifications and eco-labels [55]. Recently, Pathak, et al. [97] showed that ecolabels are a tool for disseminating a wealth of information and helping consumers make rational choices about green products, thereby promoting behavior change.

Finally, to create targeted tactics for the target audience, it is critical to take gender variations into account when considering green purchasing decisions. Gender-specific marketing strategies, such as highlighting aspects of green products that resonate with identified preferences of male and female consumers, could enhance the efficacy of campaigns. Tailoring these approaches ensures inclusivity while addressing the nuanced preferences of Generation Z segments. That way, companies contribute to sustainable development in addition to boosting sales.

6 Conclusion

Young people of Generation Z have come to be recognised for their strong inclination towards environmental and social issues. Given their importance as final consumers, the interest in this group of individuals has increased more and more. Thus, this study aimed to perform an exploratory analysis of the antecedents of the green purchasing decision of Generation Z in Portugal to answer the research question: how do antecedents influence the green purchasing decision of generation Z? The results of the study reveal that all these factors are antecedents of the green purchasing decision, although in an unbalanced way. Green willingness to purchase and environmental concern stand out in first and second place, respectively, as the main antecedents. Next, factors related to perceived quality and benefit take place. The least essential antecedent concerns the predisposition to a change in purchase behaviour if the product's price is the same or lower than the standard product, revealing that young Generation Z Portuguese are sensitive to the higher costs of green products to a small degree.

6.1 Limitations and potential research directions

Like any study, this research has limitations. The first limitation is related to the sample. Although the target audience is young Portuguese Generation Z who consume green products, the sample is non-probabilistic and collected for convenience. As such, it is not representative. In future studies, it would be useful to apply a probabilistic sampling technique and guarantee the minimum number of responses so that the sample is representative of the target audience. Furthermore, no information was collected on the geographic location of residence of Portuguese young people (urban or rural). This variable could allow exploring whether there is a different perception about the products and characteristics of green products. It should be used in future studies as a moderating variable in the proposed structural model. Second, we note that the study was conducted with individuals whose habit is to consume green products. Therefore, understanding the antecedents that foster green purchasing in consumers not geared towards this market is fundamental to making consumer behaviour increasingly sustainable. Although the results highlight low price sensitivity to green

products and high willingness to pay, it is essential to note that this study examined intentions and not actual green purchasing behaviour. Given that gaps between intention and behaviour are often reported in studies of sustainable behaviour, understanding the role of these antecedents in actual green purchasing behaviour will be vital to promoting new insights and reducing the gap between theory and practice. Third, other factors are indicated as influential in the literature. However, they were not addressed in this study, such as social norms [18], collectivism, environmental citizenship [87], generativity [35], innovativeness, creativity, materialism [42], and others. Understanding how different antecedents and determinants interact comprehensively is relevant for understanding the complexity of human behaviour. Fourth, the structural model assumes only direct relationships between variables. It would be interesting to use gender and age as moderating variables of the relationship between the variables included in the structural model. Finally, it would be interesting to consider the environmental concerns as an antecedent variable of Green Awareness Price, Green Perceived Benefits, Green Perceived Quality, and Green Willingness Purchase, with these variables mediating the relationship between environmental concerns and the green purchase decision.

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

Declarations

Ethics approval and consent to participate The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Instituto Superior Miguel Torga (protocol code CE-P21-23 approved on July 22, 2023)." for studies involving humans. Written consent was obtained from all the participants involved in the study.

Competing interests The authors declare no competing interests.

Appendix

A.1. Questionnaire available at: https://drive.google.com/file/d/1DuJmtUgTrtfDaxYWDz3rfpeyhn10Divr/view?usp=sharing

A.2. EFA and CFA results

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalities	Confirmatory Factor Loads
Green Purchase Decision (GPD)								
GPD1	0.772						0.713	0.851
GPD2	0.844						0.761	0.740
GPD3	0.839						0.739	0.732

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Communalities	Confirmatory Factor Loads
GPD4	0.707						0.746	0.850
Green Willingness Purchase (GWP)								
GWP1		0.703					0.735	0.875
GWP2		0.765					0.722	0.777
Green Awareness Price (GAP)								
GAP1			0.737				0.777	0.890
GAP2			0.766				0.714	0.906
Green Perceived Benefits (GPB)								
GPB1				0.735			0.752	0.834
GPB2				0.804			0.766	0.738
Green Perceived Quality (GPQ)								
GPQ1					0.757		0.757	0.879
GPQ2					0.794		0.799	0.850
GPQ3					0.804		0.805	0.845
Environmental Concerns (EC)								
EC1						0.778	0.732	0.746
EC2						0.799	0.753	0.825
EC3						0.799	0.798	0.826
EC4						0.752	0.711	0.759

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