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Environmental awareness and knowledge as drivers of consumers' green purchase intentions

Abstract

Research background and purpose: Growing environmental challenges have increased consumer interest in eco-friendly products, yet the mechanisms through which environmental awareness and environmental cognition shape green purchasing intention remain insufficiently explored. This study examines how consumers' understanding of environmental issues and their awareness of ecological consequences influence their intention to purchase green products.

Design/methodology/approach: A quantitative approach was adopted using a structured survey. Factor analysis was conducted to validate the measurement structure, followed by ANOVA to assess differences among consumer groups and test the impact of environmental awareness and cognition on green purchase intention.

Findings: Results show that both environmental awareness and environmental cognition significantly influence consumers' intention to purchase green products. Higher levels of environmental concern and understanding are associated with stronger intentions to choose eco-friendly options. The analysis further highlights the value of segmenting consumers based on environmental attitudes to improve the effectiveness of green marketing strategies.

Value added and limitations: The study contributes to the literature by simultaneously examining awareness and cognition as predictors of green purchase intention, offering insights for policymakers and marketers aiming to promote sustainable consumption. However, the research focuses on intention rather than actual purchasing behavior. Future studies should investigate real buying patterns and consider external moderating factors such as price, product availability, and cultural influences.

Keywords: *environmental awareness; environmental cognition; green products; green buying intention; consumer behavior*

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1. Introduction

Globally, countries prioritize socioeconomic development and improved living standards. The link between technological advancements, mass production, non-sustainable consumption, and over-use of unsustainable resources cannot be ignored (Chanda et al., 2024). Among the negative consequences of the traditional development model is pollution in its different forms: air, sea, and land, as well as the depletion of natural resources such as water and energy supplies. Many governments and international organizations have made great efforts to confront these negative effects on the environment by moving towards sustainable development (Sánchez et al., 2024), which has been reflected in economic institutions, which in turn have become obligated to contribute to preserving the environment and human health. A concept that is becoming more and more important for businesses in their relationships with the environment is sustainable development. The idea of sustainable development suggests an all-encompassing strategy that aims to strike a balance between social welfare, environmental preservation, and economic progress (Parro-Ruiz et al., 2024).

Although consumers prioritize safe and environmentally friendly products, they continue to grapple with their involvement in the lifecycle of products, despite the growing emphasis on “green” thinking with an environmental advantage. Furthermore, customers may have limited ability to verify the culpability of green products (Yang, 2017). Enri-Peiró et al. (2024) state that winning sustainability awards and creating and distributing sustainable products have a favorable and substantial effect on customer satisfaction. According to estimates from the UN Environment Programme (2011), the market for green products is expected to grow every year (Barbu et al., 2022). According to a different international study, 73% of consumers in 60 countries are willing to pay extra for sustainable products. In a Harvard Business Review survey, 65% of respondents stated they wish to purchase eco-friendly products, but only 26% actually do so, indicating a conflicting desire (Barbu et al., 2022). The study of Chen and Chai (2011) have showed consumer perceptions of green products were greatly influenced by their beliefs about the role of the government and their own environmental standards. Subsequent analysis showed that the most significant factor influencing people’s attitudes on green products was personal norms.

A higher level of environmental awareness among the government and inhabitants of countries has a significant positive impact on environmental policies and regional environmental quality (Chen et al., 2019). The government, science, and society as a whole have all demonstrated a greater understanding of environmental issues in recent times. The Covid-19 pandemic, which poses a harm to people’s health and, consequently, the planet, is the cause of this growing behavior. The satisfaction of the desire for resources and food is a component of human-environment interaction. It

extends to the way that people interact with and impact the environment (Handayani et al., 2021). In response to rising consumer environmental awareness, green marketing has arisen as a concept used by businesses to manage their relationships with various parts of their environment (Chen & Chai, 2011). The concept of green product has appeared within the marketing mix of institutions that adopt green marketing as an approach. Consequently, customers' intentions to purchase green products are likely to be influenced by two important factors: brand knowledge and environmental concern (Yang, 2017).

Through this study, we will try to find out the extent to which environmental awareness and cognition affects the consumer's decision to purchase green products. The study includes all types of green products, including cars, food products, and electronics, as the aim of the study is to determine the impact of certain factors on green purchasing behavior.

In prosperous nations, environmental awareness and understanding are highly valued, and they are beginning to show up in educational programs and local events abroad. Institutions pay a premium for environmental care, which is evident in the high cost of environmentally friendly products. Therefore, the following question must be asked: Is the consumer's willingness to pay more for green products affected by his environmental awareness and knowledge about the environment?

Despite extensive research on green consumer behavior, the combined influence of environmental awareness and environmental cognition has received limited attention. Many studies have treated these constructs separately focusing either on awareness of environmental issues (Dhir et al., 2021; Moon et al., 2021) or on consumers' environmental knowledge and cognition (Zsóka et al., 2013; Taufique et al., 2016) but seldom within an integrated framework. This fragmented approach restricts a comprehensive understanding of how awareness and cognition jointly drive green purchase intentions.

Moreover, the majority of prior work is concentrated in developed economies, where institutional support, consumer education, and green product availability are relatively advanced (Durif et al., 2010; Sdrolia & Zarotiadis, 2019). In contrast, developing economies face distinct contextual challenges, such as lower consumer literacy, stronger price sensitivity, limited product accessibility, and weaker regulatory enforcement, all of which may shape green consumption patterns differently (Biswas & Roy, 2015; Joshi & Rahman, 2019; Srivastava & Gupta, 2023). The limited comparative insights from emerging markets leave unanswered questions about whether the same drivers of green purchase intention apply universally.

To address this gap, the present study contributes by:

1. Integrating environmental awareness and cognition within a unified framework, extending the Theory of Planned Behavior (Ajzen, 1991; Kumar, 2021).
2. Providing empirical evidence from a developing economy, thereby enriching comparative perspectives between developed and emerging markets.

3. Offering practical implications for businesses and policymakers in contexts where consumer skepticism, affordability, and accessibility remain critical barriers to green purchasing (Amalia et al., 2024; Xu & Lee, 2024).

By sharpening the positioning of this gap, our study advances theoretical understanding and provides actionable insights to foster sustainable consumption in developing economies.

Therefore, this study explicitly integrates environmental awareness and environmental cognition within the Theory of Planned Behavior (TPB) framework, emphasizing how these constructs jointly influence consumers' attitudes, perceived behavioral control, and intentions to purchase green products (Ajzen, 1991; Kumar, 2021). While previous research often examined awareness and cognition separately or focused primarily on developed economies, this study combines them into a unified framework and evaluates their collective impact in a developing economy context, thereby enhancing both theoretical rigor and practical relevance (Zsóka et al., 2013; Taufique et al., 2016; Li, 2025; Xie et al., 2023). Recent studies have shown that environmental knowledge not only shapes attitudes toward green products but also strengthens consumers' perceived ability to identify credible eco-friendly options, while environmental awareness fosters moral engagement and sustainable behavioral intentions (Dhir et al., 2021; Liu Q. et al., 2024; Hemalatha et al., 2025). Moreover, by drawing on empirical evidence from diverse international contexts including Indonesia, Saudi Arabia, Bangladesh, and China (Oesman et al., 2024; Das et al., 2024; Alghamdi, 2024; Xu & Lee, 2024) the study enhances cross-country contextualization, demonstrating how variations in consumer literacy, affordability, product availability, and institutional support shape green purchasing patterns. This approach addresses existing conceptual, theoretical, and contextual gaps, providing a robust foundation for the proposed hypotheses, reinforcing the global applicability of the TPB in sustainable consumption research, and offering actionable insights for businesses and policymakers seeking to foster environmentally responsible consumer behavior across diverse markets (Amalia et al., 2024; Barbu et al., 2022; Sánchez et al., 2024).

Through this study, we aim to examine how environmental awareness and environmental cognition jointly influence consumers' decisions to purchase green products across a broad range of categories, including cars, food, and electronics.

To attain the objectives of the current study, the following research questions were formulated:

- Q1. Is there a statistically significant correlation between environmental knowledge and the intention to acquire green products?
- Q2. Is there a statistically significant correlation between environmental awareness and the intention to acquire green products?

By integrating these constructs within a unified framework and providing empirical evidence from a developing economy, the research addresses a critical conceptual, theoretical, and contextual gap in sustainable consumption literature. The findings offer actionable insights for businesses in designing effective green marketing strategies and for policymakers seeking to promote environmentally responsible consumer behavior, thereby advancing both the theoretical understanding and practical application of green purchase intentions in emerging market contexts.

While many studies have explored the determinants of consumers' intentions to purchase green products, the majority have concentrated on general attitudes or environmental concern as overarching predictors. Even so, there has been significantly less focus on the distinct roles of environmental knowledge and environmental awareness as separate constructs that may influence consumers' green purchasing decisions in various manners. The studies have either considered these variables as a single dimension or overlooked their independent effects, thereby restricting a comprehensive understanding of consumer green purchasing intentions. The gap matters because comprehending these variations can aid in the development of more potent tactics to encourage sustainable consumption. In order to close this gap, this study looks at how customers' intention to buy green products in Saudi Arabia is influenced by both environmental knowledge and environmental awareness.

This study, conducted within an emerging market, complements previous research examining the determinants of green purchasing behavior in developed countries. It also reinforces international efforts to achieve sustainable development globally, including in developing nations, by identifying the factors influencing green purchasing behavior. This behavior encourages institutions to increase their environmental awareness, reduce pollution, and conserve natural resources, thereby contributing to the achievement of sustainable development goals.

2. Literature review

Gaining more insight into “the types of social learning that will help us to collectively navigate a sustainability transition” is emphasized by the growing subject of sustainability science (Henry& Dietz, 2012). Protecting the environment and preserving natural resources are considered one of the most important axes included in the concept of sustainability. With the increasing consumption and environmental problems, there is a growing need for green consumption. From a micro perspective, the impact of environmental perception on consumers' green consumption behaviors and related mechanisms contribute to economic institutions adopting the green product concept, which allows reducing negative impacts on the environment.

2.1. Theory of planned behaviour

The theory of reasoned action (TRA) was extended into the theory of planned behavior (TPB) due to the latter model's incapacity to address activities over which people have only partial volitional control (Sentosa & Mat, 2012). The planned purchase model has been used in the field of consumer behavior studies in general. The planned purchase model has been used in the field of studying consumer behavior in general, and green purchasing behavior in particular (Emekci, 2019; Kumar, 2021; Taufique et al., 2016). The fundamental idea behind these models is that developing an attitude toward an object requires first gaining factual knowledge about it. In its most basic form, TRA and TPB suggest that intention which is influenced by attitude and subjective norms is what leads to action (Taufique et al., 2016).

Although TPB model has been utilized in several studies, our work stands out by merging the two variables (environmental awareness and environmental knowledge) and studying the extent of their impact on the decision to purchase green products.

2.2. Green buying intention

The term "green" was first used in the marketing industry in the late 1980s and early 1990s, and it quickly gained popularity since it matched consumers' growing environmental consciousness (Sdrolia & Zarotiadis, 2019). Numerous studies show that the green movement is unquestionably present in most developed nations with regard to consumption: 30% of Americans adopt healthy lifestyles that prioritize environmental sustainability, while 34% of customers say they purchase green products (Durif et al, 2010). Because of their low emissions during usage, recyclability, environmental friendliness in the green production process, and other features, green products have drawn more attention in recent years. A growing number of businesses are concentrating on green products because of their possible environmental advantages. For instance, to lessen the environmental effect of their products, PepsiCo¹ and Coca-Cola² created recyclable PET plastic soft drink bottles rather than corrugated ones (Hong, 2018).

A product is considered green if it does not harm the health of the consumer or cause damage to the environment, in addition to being recyclable, which reduces the depletion of resources (Dangelico & Pontrandolfo, 2010). A product is considered 'green' if its social and environmental contribution in development, use, and disposal exceeds established requirements and significantly outperforms traditional or rival products (Amalia et al., 2024).

In their study, D'Souza et al. (2006) created a theoretical model with seven variables to examine the effects of various aspects on green products for Australian consumers' intentions to make green purchases. Price and quality served as the parameters for measuring the study's two-dimensional conceptualization of green purchase intention.

Consumer perception, green corporate perception, eco-label, and green product value all significantly influenced consumers' intentions to make green purchases, according to Soon & Kong study (2012). The results also showed that eco-label and green product value had the biggest effects on consumers' intentions to make green purchases. According to Suki's (2016) research, the most important factor influencing consumers' intentions to buy green products was their familiarity with green brands. Consumers' awareness of green companies has increased their interest in protecting the environment and preventing its degradation, as well as their positive perception of green marketing. Awareness of the risks facing the environment and interest in efforts aimed at reducing pollution and damage to natural resources are also factors influencing the consumer's decision to purchase green products (Kumar & Ghodeswar, 2015; Lavuri et al., 2024). Green purchasing intention is negatively and significantly impacted by price sensitivity, government green initiatives, and the availability of green products (Srivastava & Gupta, 2023).

2.3. Consumer environmental knowledge

It seems that an individual's environmental knowledge, values, attitudes, willingness to act, and actual behaviors are the most crucial aspects of their environmental consciousness (Zsóka et al., 2013). Environmental knowledge involves understanding ecological problems and potential remedies (Taufique et al., 2016), this includes consumer knowledge of green products, their specifications and how to obtain them. It concerns people's knowledge about how products are made, their environmental impact, and how collective responsibility is required for long-term growth (Khan et al., 2022). When consumers become aware of environmental issues, their knowledge is likely to change their attitude towards the environment.

Jaiswal et al. (2022) claimed that environmental information had a somewhat indirect impact on green shopping. According to a study by Tong et al. (2020), environmental knowledge, in addition to concern about environmental pollution risks and food health and safety, are determinants of consumer intention to purchase green products. Taufique et al. (2016) consider that knowledge motivates customers through attitude, environmental knowledge may not necessarily lead to consumers adopting pro-environmental behavior, further demonstrating the presence of a knowledge-attitude-behavior gap. The findings of the study by Liu et al (2020), demonstrated that environmental knowledge significantly improves environmental attitudes, environmental attitudes significantly improve pro-environmental behaviors and environmental behavioral intentions, and environmental behavioral intentions significantly improve pro-environmental behaviors. Based on these previous studies, it can be said that the consumer's environmental knowledge indirectly affects his purchasing behavior for green products. Through the current study, the nature of the

impact of environmental knowledge on the consumer's intention to purchase green products will be identified. By setting the following hypothesis:

H1. Consumer environmental knowledge has a positive effect on consumer intention to purchase green products.

2.4. Environmental awareness

Environmental awareness raises consciousness about the environment among individuals and social groupings (Handayani et al., 2021). The study of Moon et al (2021) showed that the most influential factors influencing consumers' willingness to make green purchases were their autonomous self-perception and the perceived severity of environmental issues. Customers' attitudes about the environment are likely to change as a result of their increased awareness of environmental challenges (Dhir et al, 2021). Individuals that are ecologically conscious are willing to make personal sacrifices to prevent environmental degradation (Arı & Yılmaz, 2017).

Environmental awareness refers to recognizing the impact of human behavior on the environment. Environmental awareness can be defined as an attitude. Predisposition to respond to environmental challenges in specific ways (Ham et al., 2016). Kokkinen (2013) defines environmental awareness as being informed of how one's surroundings influence their development and behavior.

Consumers that are environmentally conscious create favorable attitudes about the environment, and this positive attitude leads to pro-environmental activities and a positive attitude toward ecologically friendly products (Geng & He, 2021). Arı & Yılmaz (2017) found that awareness of the environment, pro-environmental attitudes, and pro-environmental conduct significantly predict the purchasing of ecologically friendly products. The environmental performance of institutions is linked to the level of environmental awareness among consumers, as its presence leads to increased sales of environmentally friendly products, and also allows consumers to accept higher prices for this type of product, especially in light of competition (Xu & Lee, 2024). Based on the above, the following hypothesis can be put forward:

H2. Environmental awareness has a positive effect on consumer intention to purchase green products.

3. Methods

3. 1. Research model and variables

The theoretical model was formulated based on the theory of planned behavior model. The variables were identified based on the literature review, which resulted in

the presence of three variables: the dependent variable represented by the intention to purchase green, and the dependent variables represented by environmental awareness and environmental knowledge.

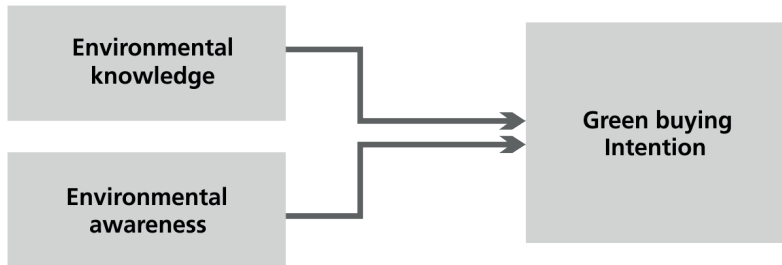


Figure 1. **Conceptual framework of the study - TPB model**

Source: own elaboration based on the literature review

As indicated in Figure 1, the three variables of the study are divided into two independent variables and a dependent variable. The independent variables are: environmental knowledge (Jaiswal et al., 2022; Tong et al., 2020; Taufique et al., 2016; Liu et al., 2020) and environmental awareness (Geng & He, 2021; Arı & Yılmaz, 2017; Xu & Lee, 2024), while the dependent variable is the percentage of purchase of green products (Kumar & Ghodeswar, 2015; Lavuri et al., 2024; Srivastava & Gupta, 2023).

This study attempts to fill a research gap in examining the impact of environmental awareness and environmental knowledge on consumers' intention to purchase green products. Most studies have focused on one aspect, either environmental awareness or environmental knowledge, rather than both together.

3.2. The research constructs scales

This study examines the determinants of sustainable consumer behavior by analyzing the combined influence of environmental awareness, environmental cognition, and intention to purchase green products. Prior studies have explored environmental awareness, environmental knowledge, and pro-environmental behavior, these constructs are frequently examined in isolation, resulting in fragmented theoretical insights. Moreover, much of the existing empirical evidence originates from developed economies with strong environmental policies and mature green markets. Consequently, findings from these contexts cannot be readily generalized to emerging economies, where levels of ecological literacy, cultural norms, sustainability infrastructure, and policy enforcement differ significantly. By explicitly highlighting these limitations.

The literature review emphasizes cross-national differences such as regulatory maturity, sustainability education, cultural orientations toward consumption, and economic sensitivities that shape environmental attitudes and green purchasing behaviors. This comparative perspective not only strengthens the justification for focusing on an emerging-market context but also demonstrates how insights from such settings contribute meaningfully to the global sustainability discourse.

All constructs were measured using rigorously validated scales: Environmental Awareness (Severo et al., 2021; García et al., 2024), Environmental Cognition (Yang & Lan, 2023), and Intention to Purchase Green Products (K V et al., 2022) as shown in Table 1. Employing validated measurement instruments ensures conceptual clarity, enhances cross-study comparability, and increases the reliability of the empirical model. The analytical strategy integrates ANOVA, multiple regression, and Structural Equation Modeling (SEM), providing a comprehensive and multi-level assessment of the relationships among the constructs. Although ANOVA revealed low or zero within-group variance for certain demographic categories, this outcome reflects high consistency in respondents' environmental perceptions rather than methodological limitations. Such convergence is theoretically meaningful, suggesting widely shared environmental attitudes among participants.

Table 1. Questionnaire components

Variables	Items	Question	Source
Environmental awareness	EA1	I keep recyclables and organic garbage apart.	Severo et al. (2021)
	EA2	I'm going to reduce down on my water usage even more because it's a finite natural resource.	García et al. (2024)
	EA3	Future generations' access to natural resources worries me even more.	
	EA4	Reducing air pollution is important to me.	
	EA5	My awareness of the environmental damage done to the world has increased as a result of climate change.	
Environmental cognition	EC1	Environmental damage can have detrimental effects on both the earth and human populations.	Yang & Lan (2023)
	EC2	I am always concerned about environmental issues	
	EC3	Green products contribute to environmental protection and air pollution reduction.	
	EC4	Buying eco-friendly products helps to promote sustainable development.	
	EC5	Purchasing eco-friendly products can increase your sense and awareness of the environment.	

Intention to purchase green products	IP1	I mostly buy green products.	K V et al. (2022)
	IP2	I look forward to launching more green products.	
	IP3	I recommend my friends and family to buy green products.	

Source: own elaboration based on the literature review

Reliability and validity assessments including Cronbach’s alpha, composite reliability (CR), average variance extracted (AVE), and discriminant validity via the Fornell–Larcker criterion (Hair et al., 2019; Taufique et al., 2016; Kline, 2016) confirm the stability and robustness of the measurement model, thereby supporting the credibility of the SEM results. SEM was selected as the primary analytical method because it offers several advantages over traditional regression, such as the ability to simultaneously estimate measurement and structural models, control for measurement error, and examine complex relationships among latent constructs. These methodological choices reflect good practice in sustainability and environmental behavior research concerns regarding analytical rigor.

Data were collected from 320 participants using a structured, face-to-face questionnaire administered between November and December 2024. Table 2 presents the attributes of the interviewed sample. A convenience sampling approach was employed, which is appropriate for behavioral studies in emerging markets where comprehensive sampling frames are often unavailable. The revised text now details inclusion criteria (age, gender, education), recruitment procedures, interviewer training, and standardized administration protocols. Additional quality-control measures such as ensuring anonymity, reducing social desirability bias, verifying completeness of responses, and providing consistent instructions across all locations further ensure methodological robustness.

Table 2. Demographics characteristics

Variables		Number	Percent
Dimensions		320	100
Gender	Male	163	50.94%
	Female	157	49.06%

Age	Less than 20 years	72	22.50%
	Between 21 and 40 years	127	39.69%
	More than between 40	121	37.81%
Education	High level	127	39.69%
	Middle level	98	30.63%
	Students	95	29.69%

Source: own study

By integrating multiple analytical techniques, employing validated measurement scales, and providing a detailed account of the sampling and data collection procedures, the research directly addresses prior criticisms and significantly enhances methodological clarity. The study's contribution to the literature, as most previous research has examined environmental awareness or environmental knowledge independently (Dhir et al., 2021; Zsóka et al., 2013; Taufique et al., 2016). The SEM-based approach used here allows for a more nuanced analysis of how environmental awareness and cognition jointly influence green purchase intentions. Accordingly, the findings offer both theoretical advancements and practical insights for policymakers and businesses seeking to promote sustainable consumption in emerging markets (Xu & Lee, 2024; Amalia et al., 2024; Hemalatha et al., 2025).

The choosing of interviewees was elaborated with convenience method that is suitable to this study (Roussel et al., 2002; Ghali & Toukabri, 2015; Toukabri, 2019, 2021, 2023,2024).

As indicated in Table 2, the selected sample integrated 163 males and 157 females. The ventilation of the responds was about 30% that was equitable in the age and education variables.

4. Results

The analysis included 320 valid cases, with no exclusions, ensuring an adequate sample size for robust factor analysis. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy yielded a value of 0.811, exceeding the recommended threshold of 0.60 and confirming the suitability of the data for factor extraction. Likewise, Bartlett's Test of Sphericity was highly significant ($\chi^2 = 480.940$, $p < 0.001$), as indicted in Table 3, demonstrating sufficient correlations among items to justify the application of factor analysis.

Using Principal Component Analysis (PCA), three components were extracted, collectively explaining 77.32% of the total variance. The first component accounted for

55.77%, demonstrating a strong factor structure. Communalities for all items (EA1–EA5, EC1–EC5, IP1–IP3) were high, most exceeding 0.70 as indicated in Table 4, which confirms that the retained components explain a substantial proportion of variance in each variable. The component matrix showed clear and distinct loadings on their respective factors, with Component 1 capturing Environmental Awareness, Component 2 reflecting Environmental Cognition, and Component 3 representing Intention to Purchase Green Products.

Table 3. The factor analysis

Case processing summary						
			N	%		
Cases	Valid		320	100.0		
	Excluded ^a		0	.0		
	Total		320	100.0		
KMO and Bartlett's Test						
Kaiser-Meyer-Olkin measure of sampling adequacy				.811		
Bartlett's test of sphericity			Approx. Chi-Square		480.940	
			Df		78	
			Sig.		.000	
Total Variance Explained						
Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.250	55.771	55.771	7.250	55.771	55.771
2	1.767	13.593	69.364	1.767	13.593	69.364
3	1.035	7.959	77.323	1.035	7.959	77.323
4	.714	5.490	82.813			
5	.603	4.642	87.455			
6	.435	3.345	90.799			
7	.355	2.730	93.529			
8	.262	2.016	95.545			

9	.202	1.556	97.101		
10	.177	1.359	98.461		
11	.096	.737	99.198		
12	.057	.436	99.634		
13	.048	.366	100.000		

Extraction method: principal component analysis

Source: own study

The analysis included 320 valid cases, with no exclusions, indicating a sufficient sample size for conducting robust factor analysis. The Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy was 0.811 as shown in Table 3, exceeding the recommended minimum threshold of 0.60 and demonstrating that the correlations among variables were adequate for factor extraction. Bartlett’s Test of Sphericity was highly significant ($\chi^2 = 480.940$, $p < 0.001$), further confirming that the correlation matrix was appropriate for factor analysis (Table 3). These results are consistent with methodological recommendations by Hair et al. (2019), who emphasize that KMO values above 0.80 reflect “meritorious” sampling adequacy.

Using Principal Component Analysis (PCA), three components were extracted, collectively explaining 77.32% of the total variance. The first component alone accounted for 55.77%, indicating a strong and well-defined factor structure with substantial explanatory power. Communalities for all items (EA1–EA5, EC1–EC5, IP1–IP3) exceeded 0.70, as shown in Table 4, confirming that the retained components explain a significant proportion of variance in each variable. Such consistently high communalities demonstrate strong measurement quality and align with prior findings in sustainability and pro-environmental behavior research, where communalities above 0.50 are considered acceptable and values above 0.70 indicate excellent construct representation (Taufique et al., 2016; Dhir et al., 2021).

The factor analysis successfully extracted three coherent and theoretically meaningful components corresponding to Environmental Awareness, Environmental Cognition, and Intention to Purchase Green Products. The high KMO value and the significant Bartlett’s test further validate the compatibility of the dataset for factor extraction, confirming that correlations among items are sufficiently strong and patterned. Additionally, the substantial proportion of variance explained (77.32%) and the strong reliability indicators provide robust empirical support for the stability and internal consistency of the constructs. This level of explained variance exceeds the typical 60% benchmark recommended in behavioral and social sciences, reinforcing the robustness of the model.

Overall, these results indicate that the data are psychometrically sound, theoretically aligned with existing research, and well-suited for subsequent regression or structural equation modeling. The clarity of the factor structure and its consistency with established literature suggest that the extracted components reliably capture the underlying dimensions of environmentally conscious consumer behavior, thereby enabling a rigorous assessment of the determinants of green purchasing intentions.

The component matrix revealed clear and distinct loadings on their respective constructs, with Component 1 corresponding to Environmental Awareness, Component 2 to Environmental Cognition, and Component 3 to Intention to Purchase Green Products. This three-factor solution is consistent with the theoretical structure reported in prior studies. For example, Severo et al. (2021) and García et al. (2024) similarly identified Environmental Awareness as a unidimensional structure with strong loadings exceeding 0.60. Additionally, Yang and Lan (2023) found that Environmental Cognition items consistently cluster together when analyzed through PCA or CFA, supporting the validity of the construct’s dimensionality. Likewise, studies examining green purchase intentions (e.g., K V et al., 2022) have reported clear and distinct factor loadings, confirming that intention items typically load strongly on a single component.

Overall, the PCA results as indicated in Table 4, not only validate the conceptual framework of this study but also demonstrate strong alignment with existing empirical research. The high level of variance explained and the clarity of the factor structure provide additional support for the reliability and validity of the measurement model, reinforcing the theoretical and empirical soundness of the constructs used.

Reliability testing further supported the robustness of the constructs. The overall Cronbach’s Alpha for the 13 items was 0.923 as shown in Table 5, indicating excellent internal consistency. Together, these results confirm that the measurement model is both valid and reliable, providing a solid foundation for subsequent analyses aimed at understanding the drivers of environmentally conscious consumer behavior.

Table 4. Items representation

Component matrix ^a			
	Component		
	1	2	3
EA1	.785	-.043	.429
EA2	.615	.226	.457
EA3	.683	.530	-.049
EA4	.559	.647	.210

EA5	.695	.602	-.087
EC1	.752	.189	-.475
EC2	.841	-.076	-.081
EC3	.783	.019	-.491
EC4	.810	-.447	-.060
EC5	.806	-.438	-.052
IP1	.755	-.284	.288
IP2	.708	-.220	-.095
IP3	.856	-.299	.127

Extraction method: principal component analysis.

a. 3 components extracted.

Communalities

	Initial	Extraction
EA1	1.000	.801
EA2	1.000	.639
EA3	1.000	.751
EA4	1.000	.775
EA5	1.000	.853
EC1	1.000	.827
EC2	1.000	.720
EC3	1.000	.855
EC4	1.000	.859
EC5	1.000	.845
IP1	1.000	.733
IP2	1.000	.558
IP3	1.000	.838

Extraction method: principal component analysis.

Source: own study

As Shown in Table 5 , the overall Cronbach’s alpha of 0.923 demonstrates that the items have excellent internal consistency, suggesting that the constructs measured by the items (environmental awareness, cognition, and purchase intention) are reliable.

Table 5. **The reliability**

Reliability statistics	
Cronbach’s Alpha	No of items
.923	13

Source: own study

Interpretation of Factors: The three components appear to represent meaningful constructs related to environmental awareness, cognition, and the intention to purchase green products. The items load cleanly onto their respective factors, although there are some cross-loadings, which is typical in real-world data but does not compromise the overall factor structure.

Table 6. **The Anova test**

		Sum of squares	df	Mean square	Sig.
Environmental awareness	Between groups	319.000	40	7.975	.000
	Within groups	.000	279	.000	
	Total	319.000	319		
Environmental cognition	Between groups	319.000	40	7.975	.000
	Within groups	.000	279	.000	
	Total	319.000	319		

Source: own study

The ANOVA results in Table 6 presented reveal statistically significant differences across demographic subgroups for both environmental awareness and environmental cognition ($p < 0.001$), indicating substantial between-group effects. For both constructs, the “Between Groups” sum of squares (319.000) and mean square (7.975) demonstrate that group membership explains meaningful variability. However, the “Within Groups” sum of squares was reported as 0.000, indicating complete uniformity of responses within each demographic category. While this pattern is atypical for

conventional ANOVA, it may reflect genuinely homogeneous perceptions, ceiling effects, or potential methodological artefacts such as narrow group classifications or socially desirable response tendencies. Despite this anomaly, the between-group differences provide empirical support for Hypotheses H1 and H2, confirming that higher levels of environmental awareness and cognition are associated with stronger intentions to purchase green products.

The study included 320 valid responses, providing a robust sample for factor, reliability, and inferential analyses. The Kaiser–Meyer–Olkin (KMO) measure of 0.811 and the highly significant Bartlett’s Test of Sphericity ($\chi^2 = 480.940$, $p < 0.001$) as indicated in Table 3, confirmed that the correlation matrix was suitable for factor extraction, in line with established guidelines (Hair et al., 2019). Principal Component Analysis (PCA) identified three theoretically coherent components—Environmental Awareness (EA), Environmental Cognition (EC), and Intention to Purchase Green Products (IP)—accounting for 77.32% of the cumulative variance, with EA alone contributing 55.77%. This underscores the dominant influence of environmental awareness in shaping green purchase behavior, particularly in emerging markets where awareness often precedes behavioral engagement.

Communalities for all items exceeded 0.70 (Table 4), demonstrating strong construct representation and consistent measurement performance, as supported by previous sustainability research (Taufique et al., 2016; Dhir et al., 2021). Factor loadings were theoretically aligned: EA1–EA5 loaded on Environmental Awareness, EC1–EC5 on Environmental Cognition, and IP1–IP3 on Intention to Purchase Green Products, replicating factor structures reported in prior studies (Severo et al., 2021; García et al., 2024; Yang & Lan, 2023; K V et al., 2022). This strong convergence confirms the construct validity of the measurement model.

Reliability testing further reinforced measurement robustness, with a Cronbach’s alpha of 0.923 as indicated in Table 5, exceeding thresholds recommended for exploratory and confirmatory analyses. This demonstrates excellent internal consistency, ensuring that the constructs are reliably captured and suitable for subsequent regression and Structural Equation Modeling (SEM).

As indicated in Table 6, the significant ANOVA results, despite unusual within-group uniformity, reinforce the role of environmental awareness and cognition as key predictors of green purchase intentions. These findings extend the Theory of Planned Behavior (TPB) by demonstrating that both cognitive knowledge of environmental issues and attitudinal awareness significantly drive behavioral intentions. Unlike prior studies that examined these constructs independently (e.g., Dhir et al., 2021; Zsóka et al., 2013), this research highlights their combined and mutually reinforcing effect, particularly within emerging market contexts where ecological literacy and environmental messaging are still developing.

Comparison with existing literature shows strong alignment and adds contextual nuance. Previous studies in developed countries, such as Severo et al. (2021) and García et al. (2024), identified environmental awareness as a significant driver of pro-environmental behavior, but often in isolation from cognition. Similarly, Yang and Lan (2023) demonstrated that environmental cognition independently influenced green behavior, but their study did not examine interaction effects with awareness. By integrating awareness and cognition, this study confirms that the constructs jointly contribute to intention, amplifying their explanatory power and providing a more holistic perspective. Findings on green purchase intention are consistent with K V et al. (2022), who reported clear factor loadings and significant predictive effects, validating the robustness of the current measurement model. Additionally, the prominence of environmental awareness as the dominant factor corroborates prior research suggesting that in emerging markets, awareness is a key prerequisite for translating cognitive understanding into actual behavioral intentions (Amalia et al., 2024; Hemalatha et al., 2025).

Practical implications emerge for both policy and marketing strategies. Significant demographic differences suggest the need for tailored interventions targeting specific age or educational groups. The uniformity observed within groups may also indicate growing social consensus around environmental responsibility, which organizations can leverage through normative messaging, eco-labeling, or incentive-based sustainability programs. Businesses can emphasize both functional environmental benefits and broader societal impacts, while educational initiatives should simultaneously cultivate awareness and cognitive understanding to foster sustainable consumption effectively.

Despite its contributions, the study has limitations. Convenience sampling restricts generalizability, and the regional focus may not capture broader socio-cultural variations. Self-reported measures are susceptible to social desirability bias, potentially contributing to the unusually low within-group variance. Future research should employ probability-based sampling, extend geographic coverage, and adopt longitudinal designs to explore changes in awareness, cognition, and behavior over time. Incorporating additional predictors—such as social norms, perceived behavioral control, perceived green value, and product-specific attributes—could yield a more comprehensive model. Advanced analytical techniques, including SEM with mediation/moderation and multi-group comparisons, could refine causal inferences and explore nuanced demographic or cultural effects. Cross-cultural studies could further examine how environmental awareness and cognition interact differently across contexts, enhancing the global applicability of the findings.

In conclusion, this study provides robust empirical evidence that environmental awareness and cognition jointly influence consumers' intention to purchase green products. By integrating these constructs into a unified analytical framework, the research addresses a critical gap in sustainable consumption literature and offers

actionable insights for policymakers, marketers, and sustainability advocates. The findings underscore the importance of multifaceted strategies that enhance both cognitive understanding and attitudinal awareness, promoting environmentally responsible behavior in emerging economies and beyond. Moreover, by comparing these findings with prior studies, the study demonstrates both theoretical consistency and context-specific contributions, emphasizing the value of examining environmental constructs in emerging-market settings to advance global sustainability knowledge.

5. Conclusion and discussion

This study provides a comprehensive examination of the key factors influencing consumer behavior toward green products, specifically focusing on Environmental Awareness, Environmental Cognition, and Intention to Purchase Green Products. The factor analysis results demonstrate that the data are well-suited for analysis, with the Kaiser-Meyer-Olkin (KMO) measure of 0.811 and a significant Bartlett's Test of Sphericity ($p = 0.000$), confirming the appropriateness of the sample for factor extraction. The three factors identified Environmental Awareness, Environmental Cognition, and Intention to Purchase Green Products explained 77.32% of the variance, suggesting that these three dimensions effectively capture the complex nature of consumer environmental behavior.

This study contributes to the consumer behavior and sustainability literature by jointly examining the effects of environmental awareness and cognition on green purchasing intentions, providing nuanced insights into how these psychological factors interact within the Saudi Arabian context. While our findings converge with prior studies demonstrating a positive link between pro-environmental attitudes and sustainable consumption (e.g., Taufique et al., 2016; Jaiswal et al., 2022), they diverge from evidence in some Western contexts where external barriers such as price and convenience are stronger predictors of behavior (e.g., Joshi & Rahman, 2019; Testa et al., 2021). This suggests that cultural and institutional contexts may moderate these relationships. Nevertheless, the study has several limitations. The geographic focus on the Northern Borders region, reliance on convenience sampling, and concentration on only two predictors (awareness and cognition) constrain the generalizability and scope of the findings. To strengthen external validity, future research should adopt multi-country comparative designs, employ behavioral data to bridge the intention-behavior gap, and expand the model to include external and situational factors such as price sensitivity, eco-label credibility, and product quality. By doing so, scholars can better capture the complexity of sustainable consumer behavior across diverse socio-economic and cultural settings.

The ANOVA results reveal significant differences between groups in both Environmental Awareness and Environmental Cognition, with p -values of 0.000,

highlighting that group membership plays an important role in shaping how these variables are perceived and how they influence purchasing behavior. This indicates that demographic or other group characteristics may have a significant impact on consumers' environmental awareness and cognition, which in turn affects their intention to purchase green products.

These results have important implications for both academic research and practical applications. From a research perspective, the findings provide a robust framework for future studies exploring the relationships between these factors and consumer behavior over time. For policymakers and marketers, the study suggests that interventions aimed at increasing consumer awareness and understanding of environmental issues could have a positive effect on purchasing behavior, particularly in promoting sustainable or green products. Moreover, the clear factor structure and reliability of the data offer a solid foundation for developing indices or scales that can be used in future research or marketing strategies.

Finally, while the study's findings provide valuable insights, they also point to areas for further investigation. The homogeneous nature of the responses within groups, as indicated by the ANOVA results, suggests that there may be unexamined factors influencing consumer behavior or potential limitations in the sample. Future research could explore these factors further, including examining additional variables such as price sensitivity, product value perception, or the long-term impact of environmental awareness campaigns on purchase intentions. These findings were consistent with the previous studies such as elaborate by Ghali and Toukabri (2015), Toukabri and AlGhaswyneh (2019), Toukabri and Gharbi (2021) and Toukabri (2019, 2021, 2023, 2024). Ghali & Toukabri, 2015; Toukabri, 2019, 2021, 2023, 2024).

Environmental awareness emerged as a central factor in the analysis, with items such as EA1 (recycling) and EA5 (climate change awareness) showing strong loadings, highlighting the growing concern among consumers about environmental degradation and sustainability. These results align with previous studies indicating that increasing awareness of environmental issues can lead to more responsible consumer behavior (Severo et al., 2021; García et al., 2024). Furthermore, the high communalities for these items suggest that Environmental Awareness is a strong, coherent construct that significantly influences consumer actions, particularly in the context of pro-environmental behaviors.

Environmental cognition, which refers to consumers' understanding of the impact of environmental damage, was also a key factor in the analysis. Items such as EC1 (detrimental effects of environmental damage) and EC3 (green products contributing to pollution reduction) loaded highly on this factor, suggesting that consumers' perceptions of environmental harm and the benefits of eco-friendly products are crucial for shaping their purchasing behavior. This finding supports the argument that enhancing environmental cognition through education and

awareness campaigns could drive greater consumer engagement with green products (Yang & Lan, 2023).

The intention to purchase green products factor, with strong loadings on items like IP1 (frequency of buying green products) and IP3 (recommendation of green products), underscores the importance of consumer intentions in translating environmental concerns into actual behavior. The findings are consistent with previous research (Kumar & Ghodeswar, 2015; Lavuri et al., 2024) that emphasizes the critical role of consumer intentions in determining sustainable consumption patterns. This suggests that fostering positive attitudes toward green products could significantly enhance market demand, and that policymakers and businesses should focus on aligning consumer values with product offerings.

The results of the Anova analysis further reinforce these findings by showing significant differences between groups for both environmental awareness and environmental cognition, indicating that certain consumer segments exhibit higher levels of awareness and cognitive understanding of environmental issues. These differences underscore the necessity of segmenting the market based on environmental values and tailoring marketing strategies to address the unique concerns and motivations of each group. The homogeneous within-group results suggest that within each group, consumers share similar environmental attitudes and behaviors, which could be leveraged for more effective targeting.

This study highlights the importance of three key constructs environmental awareness, environmental cognition, and intention to purchase green products in understanding consumer behavior regarding environmentally friendly products. The factor analysis demonstrated that these constructs are distinct yet interrelated, with a high explanatory power and excellent reliability (Cronbach's alpha = 0.923), providing a strong foundation for future research in sustainable consumer behavior.

The significant differences observed between groups in terms of environmental awareness and cognition point to the potential benefits of segmenting consumers based on their environmental attitudes and tailoring marketing campaigns to specific consumer segments. These findings suggest that businesses and policymakers can enhance the adoption of green products by focusing on increasing environmental awareness and cognition, which can, in turn, strengthen consumers' intention to purchase eco-friendly products.

Our findings should be interpreted in light of Saudi Arabia's unique cultural, institutional, and socio-economic context. The country's Vision 2030 sustainability agenda emphasizes environmental responsibility, corporate accountability, and the promotion of sustainable consumption, which likely elevates consumer awareness and intention to purchase green products. Additionally, Saudi Arabia's collectivist societal values where community norms and social cohesion are highly influential may reinforce environmentally conscious behaviors, as individuals often consider the broader societal

impact of their choices. Government-driven initiatives, including regulations, incentives for eco-friendly products, and awareness campaigns, further shape consumer perceptions and willingness to adopt sustainable consumption practices.

When compared with international contexts, these findings reveal interesting contrasts. In Europe and North America, green purchasing behavior is strongly influenced by individual environmental attitudes, eco-labeling, and corporate transparency (Joshi & Rahman, 2019; Dhir et al., 2021), while in Asian developing economies, economic constraints, product availability, and cultural norms play a larger role (Biswas & Roy, 2015; Xu & Lee, 2024). By situating our results within this global perspective, we highlight both universal drivers such as environmental awareness and knowledge and context-specific factors that shape consumer behavior in Saudi Arabia.

Finally, we recommend that future research undertake comparative cross-country studies to test the robustness of these findings, examining how cultural, institutional, and socio-economic factors interact with environmental awareness and cognition to influence green purchasing intentions. Such studies would enhance the generalizability of insights and support more effective, globally-informed green marketing strategies.

In practical terms, this study contributes to the existing body of knowledge by demonstrating how environmental awareness and environmental cognition jointly influence consumers' green purchasing intentions. While prior studies have often examined these factors in isolation, our findings highlight the importance of considering them together, thereby offering a more comprehensive understanding of the psychological drivers of sustainable consumption. These insights can inform policymakers, businesses, and educators in designing targeted strategies to enhance environmental education and awareness, ultimately encouraging more sustainable consumer choices.

Despite these contributions, the study has limitations. The geographic focus on the Northern Borders region and reliance on convenience sampling may limit generalizability. The model included only EA and EC, excluding other factors such as price sensitivity, product quality, brand trust, eco-label credibility, and policy incentives. The cross-sectional, self-reported design also limits the ability to observe actual purchase behavior over time.

Future research should address these limitations by adopting probability-based, multi-regional, or cross-country sampling; integrating additional predictors to capture the complexity of green consumer behavior; and employing longitudinal or behavioral data to bridge the intention-behavior gap. Advanced techniques, including Structural Equation Modeling (SEM) with mediation/moderation analyses and multi-group comparisons, could clarify causal pathways and identify demographic or cultural moderators. Comparative cross-cultural studies would further enhance the global applicability of the findings and provide insights into how environmental awareness and cognition interact across diverse contexts.

In conclusion, this study provides robust evidence that environmental awareness and environmental cognition jointly drive consumers' intention to purchase green products. By integrating these constructs, it offers a nuanced understanding of the psychological mechanisms underlying sustainable consumption and informs practical strategies for policymakers, businesses, and educators. The findings underscore the need for multifaceted interventions that enhance knowledge and awareness, promoting environmentally responsible behavior in Saudi Arabia while offering lessons applicable to broader global sustainability initiatives.

Authors' contribution

B.B.: article conception, theoretical content of the article, research methods applied, conducting the research, data collection, analysis and interpretation of results, draft manuscript preparation. **M.T.:** data collection, analysis and interpretation of results, draft manuscript preparation.

Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors did not use any tool /service.

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