BMC Psychology

RESEARCH

Open Access

Impact of green advertisement and environmental knowledge on intention of consumers to buy green products

Dongqin Li[1*]

Abstract

In recent years, the rising concern for environmental sustainability has reshaped consumer preferences, driving a growing interest in eco-friendly products. Green advertising, which promotes products based on their environmental benefits, has emerged as a powerful tool in influencing consumer intentions and encouraging sustainable choices. Green advertising has transformative impacts on buying intention of consumers towards green products, and this leads to advancement of economic sustainability. This study explorese the impact of green advertising and environmental knowledge on consumers' intentions to purchase eco-friendly products, addressing a critical gap in understanding the psychological factors that drive sustainable consumer behavior. Additionally, the study discusses the role of eco-branding, eco-labelling, and consumer innovativeness as moderators of the intention of green product purchase. The data was collected from 512 Chinese individuals and employed structural equation model for empirical analysis. Our findings reveal that green advertising has a significant positive influence on consumers' intention to buy green products, with environmental knowledge amplifying this effect. Additionally, factors such as eco-branding, eco-labelling, and consumer innovativeness further enhance consumers' inclination towards sustainable purchases. These insights highlight the importance of integrating educational elements into green advertising strategies and suggest that companies should invest in eco-labelling and branding to reinforce consumer trust and engagement with sustainable products. The empirical findings carry implications for refining green advertising strategies, suggesting increased investments in both green production and advertising initiatives.

Keywords Green advertisement, Green purchase intentions, Environmental knowledge, Consumer innovativeness, Eco-branding, Eco-labelling

*Correspondence:
Dongqin Li
lidongqin202303@163.com
[1]School of Economics and Management, Shangqiu Polytechnic, Shangqiu 476100, China

Introduction

Nowadays, consumer intentions for environmental protection and adoption of green practices have gained much significance [1–2]. Green consumerism, therefore, has become an evolving idea that caused consumers to become more sensitized to environmental issues and opting environment-friendly products [3–4]. The research showed that environmental concerns are forcing the manufacturers to delve into the producing and marketing of eco-products [5].

Environmental issues have now heightened to alarming levels due to rapid growth of Chinese economy. In spite of one of the largest consumer of energy and emitting highest levels of carbon, China is also facing an escalating trend in energy consumption. Therefore, it requires the encouragement for consumers to use green products and there is a need for concentrated research on this aspect [6]. Green advertisement is one of the most significant resources to quickly introduce the benefits of green products to consumers. Prior studies suggest that there is high possibility to influence purchase intentions of consumers when product attributes are added to green advertising. Through green advertising, consumers will be able to learn about the environmentally-friendly features of the product including energy-saving technologies and certification [7], while companies can also ensure an effective communication of environmental benefits of green products. For example, Miller and Sinclair [8] found that advertisement focused on environmental benefits will help to stimulate the purchasing intentions, thereby causing customers to opt for environmentally-friendly items. Although consumers approaching the content of green advertising feel some skepticism initially regarding its authenticity effective green advertising can aid the businesses to benefit a great deal and reduce the skepticism of consumers. It is very important to inform consumers about such products through green advertising [9].

Despite its importance, research on direct relation between green advertisement and purchase intentions is limited, particularly regarding mediating role of consumers' environmental knowledge. A number of studies pertaining to the analysis of public attitude toward green advertisement [10], indicate that the creation of green advertising changes consumers' buying intentions. Sociodemographic factors also determine customers' perception of eco-friendliness [11–13]. However, attention is needed to understand the direct link between green advertisement and consumer's purchase intentions in addition with mediating role of consumers' environmental knowledge.

Eco-branding and eco-labelling are other most significant factors that affect purchase intentions since they increase consumer trust, provide credible information, and reinforce the perceived value of eco-friendly products. Eco-branding is the process of creating a distinct identity for a product or company based on its environmental sustainability efforts [14]. A strong eco-brand reduces skepticism regarding credibility of green claims, thereby enhancing purchase intentions. On the other hand, eco-labelling is a practice of using certified labels to communicate the conformity of a product to recognized environmental standards. Eco-labels are a reliable source of information that signals the product meets specific environmental criteria [15]. Eco-labels provide clear and transparent information, simplifying decision-making for environmentally conscious buyers.

Understanding how green advertising influences consumer intentions is important for promoting eco-friendly products and practices in the presence of increased environmental concerns. Consumers' awareness of environmental issues also largely contributes to market dynamics because it gives businesses insights into effectiveness of green advertisement in marketing eco-friendly products and encouraging sustainable choices. The understanding of the effectiveness of green advertising also enables companies to develop more specific and focused advertisement strategies by optimally using resources because such campaigns generally target environmental consumers. Thus, the paper focused on study of how green advertising impacts purchasing intentions of consumers with mediating role of environmental knowledge. Thus, this research would contribute to the theoretical discourse on green advertising and provides practical implications for firms in crafting successful marketing strategies for green advertising.

Additionally, eco-branding and eco-labelling are essential elements of green advertising that warrant further exploration. Eco-labels enhance credibility and inform consumers about sustainability features, while eco-branding establishes a company's environmental identity. Both are critical in shaping consumers' purchase intentions. Therefore, this research emphasizes the role of eco-branding and eco-labelling as complementary tools in green advertising to drive environmentally conscious intentions. By addressing these aspects, this study provides valuable theoretical and practical implications for promoting eco-friendly products and advancing sustainable marketing strategies.

Earlier literature and hypothesis

The "Theory of Planned Behavior" (TPB) explains and predicts the human behavior in a broader range of contexts, including health, social, and consumer behavior. It is built on the conception that intentions of people to perform specific behaviors are best predictors of whether they will actually engage in that behavior [14–15]. The study [16] views environmentally friendly behavior as "behaviors that do not pose any harm to the

environment". Earlier literature has given enough attention to a number of environmentally friendly goods and services, green services sectors [17–18], and provided relationships between purchase intention and behavior of consumers toward environment friendly product. The variables of the TPB support the intentions and attitudes of consumers partially or completely [19–20]. To clarify the connection between TPB, it is further explained how its constructs relate to green advertisement. TPB suggests that human behavior is influenced by three key constructs: attitudes, subjective norms, and perceived behavioral control.

Attitudes Green advertisements often promote the benefits of environmentally friendly products and their positive impact on sustainability, which shapes favorable attitudes toward such products. A consumer's perception of the ecological value highlighted in green advertisements strengthens their intention to purchase green products.

Subjective norms Green advertisements may change societal norms by emphasizing the desirability of pro-environmental behaviors. When individuals observe others endorsing or adopting green practices through advertisements, these social cues influence their purchase intentions.

Perceived behavioral control (PBC) PBC relates to a consumer's belief in their ability to act on purchase intentions. Green advertisements that emphasize ease of access, affordability, or practical benefits of green products may enhance PBC, thus positively influencing purchase behavior.

The "Value Belief Norm" theory claimed that due to the belief in pro-environmental values, beliefs and norms are developed, which thereafter affects the perceptions regarding environment. These norms influence the people in making them more willing to perform pro-environmental actions. This theory has been utilized in numerous environmental and sustainability studies in designing interventions, communication strategies, and policies to ensure environmentally responsible actions [21]. VBN theory offers insights into the role of values and personal norms in shaping pro-environmental behaviors.

Values and beliefs Environmental knowledge imparted through green advertising can align with individuals' pro-environmental values, leading to stronger beliefs about the importance of sustainability.

Norms Green advertisements that emotionally appeal to care for future generations or highlight corporate environmental responsibility create a sense of obligation or responsibility. This triggers personal norms, motivating individuals to engage in environmentally friendly behaviors.

Green advertisement is a concept that considers protection of environment as main theme, and way of communication for eco-friendly message [22]. Banerjee et al. [23] is of view that green advertisement must meet one of given conditions: (i) presenting explicit and implicit relation between the product and biophysical environment (ii) promoting a green lifestyle in which products/services are de-emphasized; and (iii) portraying corporate environmental responsibility". Earlier studies established positive association among green advertisement and purchase intentions of green products [24–25]. Positive and persuasive message in green advertisements can induce a more favorable attitude toward these communications. For example, emphasis of the benefit of the environment of products or commitment toward sustainability by the company enhances the perception of such products by consumers [26]. Such environmental friendly products usually highlight the value through ecological benefits of an environmentally-friendly product or service, the saving of energy, prevention of waste or healthy environment. This can lead consumers to perceive these products as more valuable in terms of environmental and personal benefits. Through this, it is understood that perceived value increases purchase intentions [27]. Such an effective advertisement can create positive credibility or trust for brands. When the consumers perceive that the brand is seriously concerned with being environmentally friendly and socially responsible toward the environment, they use more environmentally friendly products [28]. Green advertisements may change social norms where such environmentally friendly behavior is encouraged and perceived to be desired by society. When consumers see other people making green choices, they tend to imitate even more, which eventually leads to stronger intentions toward making green purchases [29]. Moreover, the majority of green advertisements use green appeal emotionally; in other words, appeal to sympathize or love for nature or care for future generations. These emotional relations can give a feeling of responsibility or obligation to pursue green behaviors, thus influencing buying intentions [30]. Green advertising aims to change behavioral intentions of consumer, encourages the consumer to buy green products or adopt green practices [12].

As in TPB, perceived control within VBN theory includes factors like accessibility and feasibility of green choices. Green advertisements emphasizing ease of action resonate with these secondary beliefs, bridging the gap between values and behaviors. The TPB and VBN theories explain how green advertising influences attitudes, norms, and perceived control, while

also leveraging values and beliefs to drive intentions and behaviors. This theoretical foundation provides a robust framework for understanding the mechanisms by which green advertising and environmental knowledge influence consumer behavior, ultimately forming the basis for the proposed hypotheses.

H1 *Green advertisement has positive impact on intention of consumer to buy green product.*

Eco-labelling is giving labels or certifications to products so that consumers can see what their environmental attributes are or whether they comply with the sustainability standards. Eco-labelling enhances buying behavior of consumer towards green items [31] and informs the consumer about the environmental impact of a product and the sustainability feature of that product [32]. This transparency allows the consumer to make informed purchasing decisions since they can easily point out what products fall into their values and preferential necessities of ecologic friendliness. Likewise, the study [33] established that third-party certification organizations or government agencies which set and validate environmental standards are often linked to eco-labels. This association of the linkage builds trust and credibility regarding the environmental claim of the product. Consumers trust products with known eco-labels, and it positively affects their purchasing behavior [34]. Eco-labels raise the information between consumer and producer. Without such labels, a consumer does not know whether the product has a positive or negative environmental impact. Eco-labels bridge this gap by providing standardized and credible information [35]. Eco-labels also act as a quality signal. Consumers often associate environmentally certified products with higher quality and durability [21]. To companies, eco-labelling can be a source of product differentiation in the market. Having a recognized eco-label, a product is then differentiated from its competitors and attracts environmentally aware consumers; in turn, it possibly enhances the market share [36]. In a nutshell, eco-labelling positively influences the consumer buying pattern of green products as it will give the consumer information, create trust, signal quality, reduce information asymmetry, and harmonize with consumers' values and sustainability goals. It would, therefore has pivotal role in promoting eco-friendly choices and encourage firms to adopt sustainable practices.

Eco-branding can be defined as the marketing strategy or approach adopted by companies to market their brand based on its environment-friendly attributes, its commitment to sustainability, and responsible practices. It is the integration of environmental or ecological concerns into the branding and communication of a product or company [37]. Eco-branding indicates concern for the environment and social responsibility. When a consumer believes that a brand cares about sustainability, trust and credibility are built. Consumers will believe and trust more eco-brands, which further influences their buying decisions positively [38]. Most consumers hold sustainable and eco-friendly practices. Eco-branding appeals to this value, and by virtue of purchasing decisions, a consumer is able to express and convey his or her belief and preference. This makes such consumers demonstrate greater loyalty towards eco-brands and have a higher likelihood to opt for the product [39]. The study [40] believed that in today's highly competitive market scenario, eco-branding can make a product individually identifiable. When customers are exposed to such eco-friendly branding, they would find it unique and even preferable as compared to other similar products. Thus, in such a differentiation, increased sales and market share of the eco-branded products result. Another study [41] analyzed the impact of eco-branding on the Malaysians to understand consumer's intention, and found that consumers who purchase eco-branded products may become advocates for those brands, sharing their positive experiences and encouraging others to make similar choices. More and more consumers may be influenced by the same due to a peer effect, which leads to word-of-mouth communications about such products [42]. The study [43] determined relation between branding and purchasing behavior and found that as consumer demand for green products grows, eco-branding can help companies to enter new markets. Eco-branding can attract environmentally conscious consumers who might not have considered the brand otherwise. Thus, following hypotheses have been formed.

H2 *Eco-labelling has positive influence on buying intentions of consumers for green products.*

H3 *Eco-branding has positive influence on buying intentions of consumers for green products.*

Consumer innovativeness is a concept which explains how readily a consumer accepts innovations as compared with others [44]. Innovative consumer is often early adopter of new product and trends. When innovative consumers perceive green products as novel and innovative solutions to environmental issue, they are the first to purchase and try these products [45]. Innovators are typically more willing to take risks and try new things. Green products, especially those with emerging technologies or unconventional features, may be seen as riskier choices. However, innovative consumers are more open to taking these risks, making them experiment with green product [23]. Innovative consumers often seek out unique and novel experiences. Green products, particularly those that incorporate innovative eco-friendly technologies or design, can appeal to this desire for novelty,

attracting innovative consumers who are drawn to the uniqueness of green solutions [46–47]. The study [48] suggested that innovative consumers can influence their social networks. When they adopt and advocate for green products, their recommendations and actions can inspire others within their social circles to do the same, creating a ripple effect of green product adoption. Innovativeness can be closely tied to a desire for sustainable and progressive solutions. Green products often represent innovative approaches to addressing environmental challenges, making them appealing to consumers who seek solutions that align with their forward-thinking values [49].

H4 *Consumer innovativeness positively influences the green purchase intention of consumer.*

Environmental knowledge is information, understanding, and awareness related to the environment, encompassing various aspects such as ecosystems, natural resources, environmental issues, conservation practices, and impact of human activity on natural world. Environmental knowledge can indeed play a mediating role in relation between green advertisement and purchasing behavior of consumers for eco-friendly product. Green advertising serves as a stimulus that promotes environmentally friendly product and conveys information about their environmental benefits and attributes. This advertising can influence consumers' perceptions, attitudes, and intentions related to green products [50]. Grimmer & Bingham [51] argued that green advertising provides information to consumer about the environmental attributes of a product. Environmental knowledge helps consumers process and understand this information more effectively. Consumers with high environmental knowledge are better equipped to comprehend messages in green advertisements and make informed buying decisions. The study [52] is of view that environmental knowledge influences the formation of attitudes and beliefs related to environmental issues. When consumers have environmental knowledge, they have positive attitude towards eco-friendly products and sustainability. These attitudes, in turn, can drive their buying behavior. Consumers who are knowledgeable about the environmental benefit of a product may perceive it as more valuable, not only in terms of its ecological impact but also in terms of its long-term benefits, which can positively affect their buying behavior. It is argued that environmental knowledge can lead to the development of stronger behavioral intentions to engage in pro-environmental behaviors [53]. When consumer has good knowledge about environment, then it supports eco-friendly initiatives through their purchasing decisions. They can critically evaluate green advertising claims, assess the authenticity of environmental labels, and make choices that align with their values and the information presented in advertisements [54]. So the following hypothesis is developed.

H5 *Green advertising positively influences consumers' purchase intentions through the sequential mediating effects of environmental knowledge.*

The conceptual framework is given in the following Fig. 1.

Materials and methods

Participants

The respondents were given a questionnaire developed on the basis of earlier related studies on the topic [54–60]. A five-point Likert scale is used to evaluate the responses. The written ethical consent was received from the respondents in the beginning, and then questionnaire was sent to those respondents who were willing to participate in the study. Chinese people were the target population and convenience sampling method is adopted. The choice of the Chinese population as the study context is deliberate and significant, considering China's prominent role in global sustainability initiatives and its unique cultural and market characteristics. As the world's most populous country and the second-largest economy, China has a critical impact on global environmental challenges. Moreover, China's collectivist society places high value on social harmony and collective well-being. Green advertisements that emphasize the societal benefits of environmentally friendly behaviors, such as protecting the environment for future generations, resonate strongly with these cultural values. By selecting China as the study context, this research leverages a setting where cultural values, government policies, market dynamics, and consumer behavior uniquely converge to shape the effectiveness of green advertising and environmental knowledge. Understanding these factors provides valuable insights not only for advancing theoretical frameworks but also for guiding practitioners and policymakers in designing effective green marketing and sustainability strategies.

Material

After ensuring the accuracy of questionnaire, a sample is collected during March-June 2024 through online resources like emails, and social media platforms. Questionnaire was sent via emails and social media to 715 individuals and received back 589 responses but 512 responses were selected for empirical analysis. Table 1 depicts the scales and constructs.

Procedures

The data collection process followed a structured and systematic approach to ensure reliability, validity, and ethical considerations. The participants were selected using a convenient sampling method. Initially, potential participants were identified through social media

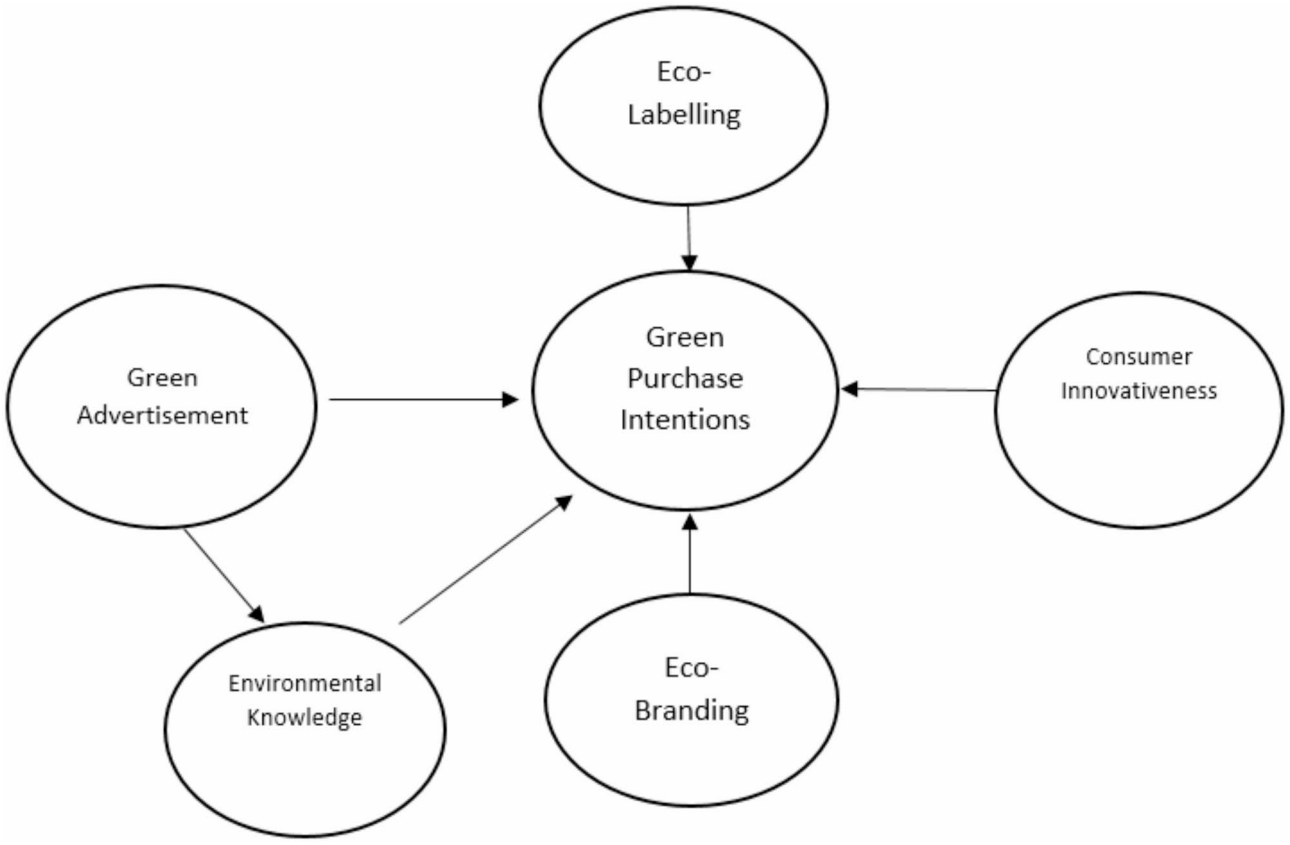

Fig. 1 Conceptual Framework

platforms and professional networks. They were then approached via email invitations and social media outreach. The study purpose, expected duration, and ethical considerations, including confidentiality and voluntary participation, were clearly communicated to them. Each participant was required to provide informed consent before proceeding with the study. The participants received a questionnaire, designed to capture their perceptions, experiences, and relevant data. The survey was administered through online forms and responses were recorded with participant consent. The data collection process took place over a period of four months. Participants were given two weeks to complete the survey, and follow-up reminders were sent where necessary to ensure a high response rate. Moreover, the participants were guided through the process, and their responses were systematically recorded. Anonymity and confidentiality were strictly maintained, and no personally identifiable information was linked to the responses. Additionally, participants were informed that they could withdraw from the study at any time without consequences. To enhance the reliability of the collected data, a pilot study was conducted before the main data collection phase. This helped to refine the questionnaire/interview structure and ensure clarity in the questions.

Data analysis

The data analysis process began with a demographic analysis of the respondents, which highlighted key characteristics such as education level, gender, age, and social media usage experience. Internal consistency of the constructs was assessed using composite reliability and Cronbach's alpha. Then convergent validity was determined using factor loadings and average variance extracted. Common method bias was addressed using Harman's single-factor test and marker variable techniques. Discriminant validity was evaluated using the Fornell-Larcker and HTMT approaches. The structural model was tested using PLS-SEM, incorporating criteria such as R^2, f^2 effect sizes, inner VIF, and Q^2 predictive relevance. Bootstrapping with 5,000 resamples was employed to derive t-values and p-values for path coefficients. Table 2 includes general information about respondents.

In the beginning, composite reliability (CR) and Cronbach's α (CA) are determined to find the internal consistency and findings are shown in Table 3. In addition, factor loading is computed to determine convergent validity through "average variance extracted" (AVE).

The value of CA is between 0.73 and 0.86 indicating good internal consistency of constructs. While values

Table 1 Scales and constructs

Green Advertisement (GRA)
"I tend to pay attention to products with environment saving label through green advertising.
I tend to focus on advertising information that talk about the environment.
I think green advertising expresses the true nature of the product.
I think I can get a more effective message from this green ad than from a traditional ads
I have a relatively strong interest in knowing about that green ad compared to traditional ads
I think the format of the green ad is relatively new compared to traditional ads
Green Purchase Intentions (GRI)
Green products are better for the environment as compared with general products.
Green products have value against paid money.
I expect that green products increase environmental performance.
I am willing to recommend eco-friendly products to others.
Using eco-friendly products relieves the guilt of environmental destruction.
Eco-Labelling (ELB)
I plan to purchase eco-labeled products in the future.
I am willing to purchase more eco-labeled products while shopping.
From now on, I plan to purchase eco-labeled products.
I intend to pay more for eco-labeled products.
If an eco-label product is not available I postpone my purchase.
Eco-Branding (EBR)
For those brands that use green messages in their advertisements, I think they are good.
I take attention to eco-labeled products through green advertising.
Green advertising is valuable in my opinion.
Green brands use renewable sources of energy.
Green brands help us saving the environment.
Consumer Innovativeness (CIN)
I tend to pursue new trends more than others.
I often go to the store to see if a new product is out.
I tend to buy the latest trendy products.
I tend to watch with interest how other people use new products.
Choosing between two products, I always buy the one which has the minimum impact on people and the environment.
Environmental Knowledge (ENK)
I think that green products provide higher quality than regular ones with the exact same characteristics.
I have more knowledge about recycling then an average person.
I know where I can find products that create less wastage.
I have knowledge about the sustainability symbols used on product packages.
I am very knowledgeable about environmental and social issues."

Table 2 Demographic analysis ($N = 512$)

Item	Sub-Item	Frequency	Percentage
Education	Secondary Level	89	17.38
	Bachelor Level	265	51.76
	Master Level	125	24.41
	PhD Level	33	6.45
Gender	Male	298	58.20
	Female	214	41.80
Age	20–24 years	131	25.58
	25–29	293	57.23
	30–34	88	17.19
Usage experience of social media	1–4 years	221	43.16
	5–8	201	39.26
	9–12	90	17.58

of CR fall in the range of 0.82–0.85 supporting values of CA. Each value of AVE is ˃ 0.5 showing the reliability of the model.

To address the potential issue of common method bias, we utilized Harman's single-factor test. This approach involves performing an exploratory factor analysis on all constructs to determine whether a single factor accounts for the majority of variance in the dataset. The analysis revealed that the first factor accounted for less than 40% of the variance, indicating that common method bias is not a significant concern in this study. Additionally, the study employed marker variable techniques as an advanced statistical control to assess CMB further. A theoretically unrelated marker variable was included in the analysis, and its correlation with the key constructs was

Table 3 Factor loading

Constructs	Factor loading	CA	CR	AVE
Green Advertisement (GRA)		0.73	0.82	0.62
GRA 1	0.69			
GRA 2	0.72			
GRA 3	0.81			
GRA 4	0.88			
GRA 5	0.84			
GRA 6	0.79			
Green Purchase Intention (GRI)		0.73	0.84	0.63
GRI 1	0.83			
GRI 2	0.75			
GRI 3	0.89			
GRI 4	0.90			
GRI 5	0.79			
Eco-labelling (ELB)		0.77	0.83	0.64
ELB 1	0.78			
ELB 2	0.70			
ELB 3	0.77			
ELB 4	0.69			
ELB 5	0.72			
Eco-branding (EBR)		0.76	0.85	0.69
EBR 1	0.77			
EBR 2	0.72			
EBR 3	0.79			
EBR 4	0.69			
EBR 5	0.70			
Consumer Innovativeness (CIN)		0.86	0.83	0.67
CIN 1	0.89			
CIN 2	0.81			
CIN 3	0.77			
CIN 4	0.62			
CIN 5	0.69			
Environmental Knowledge (ENK)		0.79	0.82	0.72
ENK 1	0.71			
ENK 2	0.82			
ENK 3	0.79			
ENK 4	0.74			
ENK 5	0.75			

"Note: Composite Reliability = CR; Cronbach's α = CA; Average Variance Extracted = AVE"

checked. The results confirmed that no significant bias was introduced due to the data collection method.

The discriminant validity is computed through Heterotrait Monotrait ratio of correlations (HTMT) and Fornell Lacker approaches. The estimated values of discriminant validity are shown in Table 4 which conveys that model may be used for further analysis.

The values of HTMT are less than standard value of 0.90, as reported in Table 5.

To present the correlation coefficient matrix, we calculated the Pearson correlation coefficients among all constructs to demonstrate the relationships between variables as reported in Table 6. These correlations are particularly relevant as they were discussed in the results section.

All correlations fall within the acceptable range, ensuring no issues with multicollinearity and supporting the validity of the constructs. The correlation values align with the findings reported in the discussion section.

Results

After finding the discriminant validity and correlation matrix, the study evaluated the structural model using PLS-SEM through six criteria [61]. Larger loadings indicate stronger relationships between indicators and latent variables. The issue of multicollinearity is addressed in the first stage. Similarly, "assessing the amount of impact size (f2), the level of effect size (R2), and the predictive significance of the structural model relationship is important for determining the relationship's importance (Q2). Furthermore, using bootstrapping with 5000 resamples, it is crucial to evaluate the corresponding t-values of the path coefficients. The evaluation of the relationship's impact sizes is crucial because the p-values only inform us of the existence of an effect but not its magnitude" [62]. Table 7 contains the results of R^2, F^2, VIF, and Q^2.

The results presented in Table 7 provide insights into the structural model's performance and the relation among the variables. The coefficient of determination (R^2) for green purchase intention (GRI) is 0.32, indicating that the independent variables explain 32% of the variance in GRI. The adjusted R^2 (0.31) further confirms the model's robustness. Based on the classification by Gong

Table 4 Fornell larcker Appraoch

Construct	GRI	GRA	ELB	EBR	CIN	ENK
GRI	0.80					
GRA	0.61	0.71				
ELB	0.62	0.70	0.73			
EBR	0.65	0.63	0.72	0.79		
CIN	0.65	0.54	0.61	0.55	0.72	
ENK	0.45	0.52	0.65	0.68	0.48	0.82

"Note: Green Advertisement = GRA; Green Purchase Intention = GRI; Eco-labelling = ELB; Eco-branding = EBR; Consumer Innovativeness = CIN; Environmental Knowledge = ENK"

Table 5 HTMT approach

Construct	GRI	GRA	ELB	EBR	CIN	ENK
GRI						
GRA	0.51					
ELB	0.62	0.68				
EBR	0.65	0.72	0.75			
CIN	0.52	0.61	0.65	0.71		
ENK	0.45	0.61	0.52	0.63	0.42	

"Note: Green Advertisement = GRA; Green Purchase Intention = GRI; Eco-labelling = ELB; Eco-branding = EBR; Consumer Innovativeness = CIN; Environmental Knowledge = ENK"

Table 6 Pearson correlation

Construct	GRI	GRA	ELB	EBR	CIN	ENK
GRI	1.00					
GRA	0.61	1.00				
ELB	0.62	0.70	1.00			
EBR	0.65	0.63	0.72	1.00		
CIN	0.65	0.54	0.61	0.55	1.00	
ENK	0.45	0.52	0.65	0.68	0.48	1.00

"Note: Green Advertisement = GRA; Green Purchase Intention = GRI; Eco-labelling = ELB; Eco-branding = EBR; Consumer Innovativeness = CIN; Environmental Knowledge = ENK"

Table 7 Structural model

R^2	Dependent variable GRI	R^2 0.32	R^2 adjusted 0.31	Gong et al. [37] 0.02 = weak 0.13 = moderate 0.26 = substantial
F^2	Independent variables			
	ELB			
	CIN		0.121	
	EBR			
	GRI	0.041	0.132	
	GRA	0.052	0.044	
	ENK	0.013	0.010	
Inner VIF	Independent variable			VIF ≤ 5.0
	ELB	1.43	2.10	
	CIN	1.41		
	EBR	2.71	2.93	
	GRI	2.68	2.42	
	GRA	2.85	2.79	
	ENK	2.89	1.72	
Q^2 = 1-SSE/SSO	Dependent variable	CCR	CCC	
	CIN	0.21	0.61	
	GRI	0.34	0.63	
	ENK	0.35	0.69	

"Note: Green Advertisement = GRA; Green Purchase Intention = GRI; Eco-labelling = ELB; Eco-branding = EBR; Consumer Innovativeness = CIN; Environmental Knowledge = ENK; CCR = Constructs Cross-validated Redundancy; CCC = Constructs Cross-validated Communalities"

et al. [37], this value is substantial, suggesting a strong model fit. The F^2 values reflect the effect size of individual predictors, with consumer innovativeness (CIN) showing the highest contribution (0.121) to the variance in GRI, followed by eco-branding (EBR, 0.132) and green advertisement (GRA, 0.044). Lower F^2 values for environmental knowledge (ENK, 0.010) and eco-labelling (ELB, 0.041) suggest relatively smaller but still significant contributions.

The inner VIF values are all below the threshold of 5.0, confirming that multicollinearity is not a concern and the predictors are independent of one another. Among the predictors, eco-branding (EBR) and green advertisement (GRA) exhibit higher VIF values (2.93 and 2.79, respectively), but these remain within acceptable limits.

Table 8 Path coefficients

Hypotheses	β/OS	LL	UL	T	*P*
GRA → GRI	0.32	0.41	0.29	1.59	0.01
ELB → GRI	0.22	0.13	0.29	1.83	0.02
EBR → GRI	0.43	0.12	0.61	3.31	0.01
CIN → GRI	0.52	0.18	0.63	3.88	0.01
GRA → ENK → GRI	0.51	0.08	0.62	3.14	0.01

"Note: Green Advertisement = GRA; Green Purchase Intention = GRI; Eco-labelling = ELB; Eco-branding = EBR; Consumer Innovativeness = CIN; Environmental Knowledge = ENK"

Predictive relevance (Q^2) was assessed through the Blindfolding procedure, which evaluates the cross-validated redundancy of the structural model. Q^2 values greater than zero indicate predictive relevance for the respective endogenous constructs. The Q^2 values for the endogenous constructs were calculated using the Blindfolding procedure. The results, presented in Table 6, demonstrate the model's predictive relevance with Q^2 values of 0.21 for CIN, 0.34 for GRI, and 0.35 for ENK. CCR further support the model's reliability, with GRI (0.63) and ENK (0.69) exhibiting the highest communalities, reflecting a strong shared variance between the predictors and their constructs.

All values are in acceptable range so all hypotheses may be accepted. The values of LCL and UCL are positive while T and P values are significant as shown in Table 8.

The results reported in Table 8 show that all hypotheses are supported, as the values fall within acceptable ranges, with statistically significant T-values (greater than the standard threshold of 1.96) and P-values below 0.05, confirming the reliability of the findings. The positive path coefficients (β) across all relationships demonstrate that the constructs positively influence one another. Specifically, green advertisement (β = 0.32) has a direct and positive impact on green purchase intention, indicating that targeted green advertising effectively encourages consumers to prefer environmentally friendly products. The conceptual framework with coefficient values is shown in Fig. 2.

Similarly, eco-labelling (β = 0.22) and eco-branding (β = 0.43) also positively influence green purchase intention, emphasizing the role of clear and trustworthy information about product and brand reputation in driving consumer behavior. Consumer innovativeness (β = 0.52) emerges as a strong determinant, suggesting that consumers who are more open to new ideas and innovations are more likely to exhibit higher intentions to purchase green products. Moreover, the mediating role of environmental knowledge (GRA → ENK → GRI, β = 0.51) highlights its critical function in strengthening the relationship between green advertisement and green purchase intention. This indicates that as consumers become

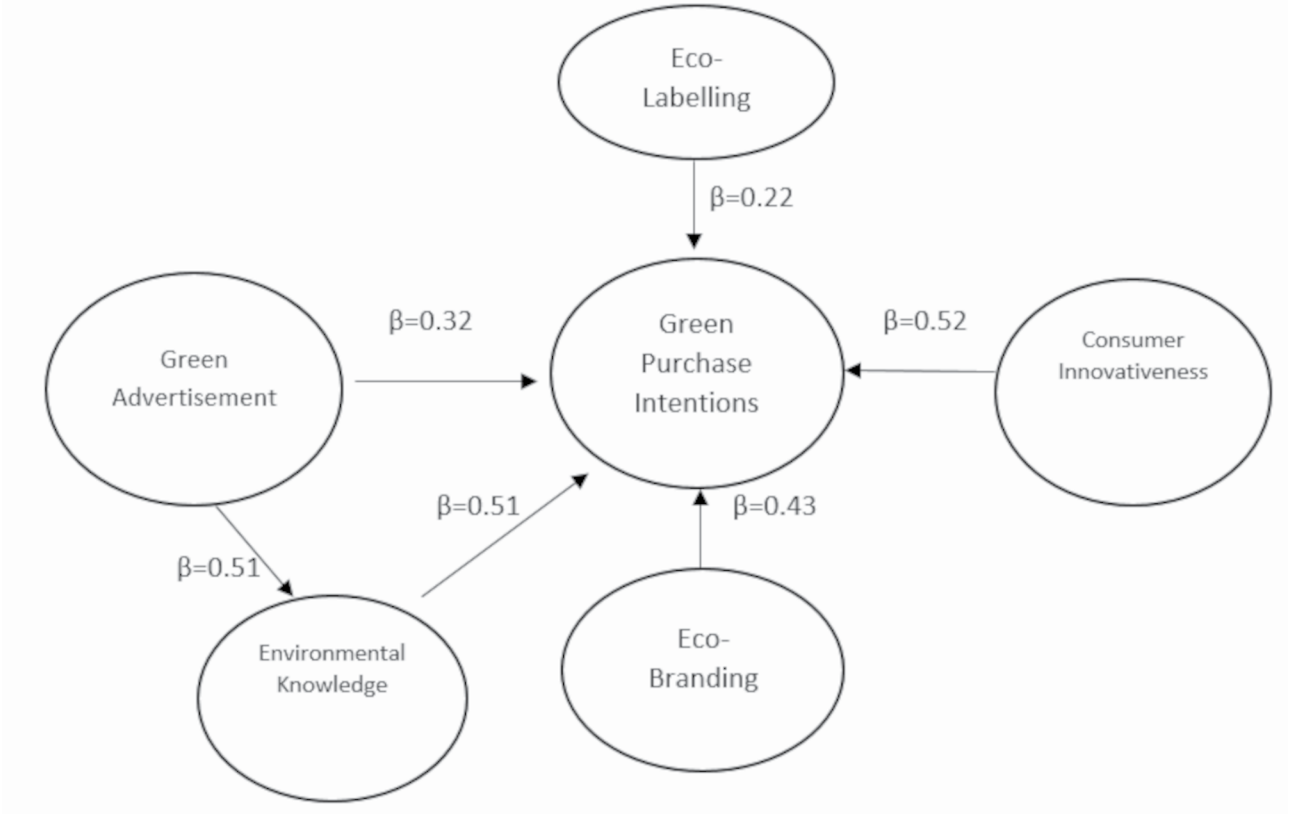

Fig. 2 Estimated coefficients

more knowledgeable about environmental issues through effective advertising, their likelihood of preferring sustainable products increases. The confidence intervals (LCL and UCL) for all paths remain positive, reinforcing the robustness of these relationships. The findings confirm that green advertisement, complemented by eco-labelling, eco-branding, consumer innovativeness, and environmental knowledge, significantly influences consumers' green purchase intentions. The results underline the importance of strategic marketing efforts and public awareness campaigns in shaping consumer preferences toward sustainable consumption. By leveraging these factors, businesses can foster a culture of environmental responsibility and contribute to broader sustainability goals.

Discussion

The findings of study, which explored the relation between green advertisement and purchasing behavior while considering the mediating influence of environmental knowledge, indicate several significant positive associations. Specifically, green advertising, eco-labelling, eco-branding, and consumer innovativeness all exhibit positive correlations with buying behavior for green product. Notably, green advertisement emerges as a robust predictor of buying behavior accepting the hypothesis 1. Therefore, in the Chinese context, it is plausible to assert that green advertisement holds increasing potential to shape consumer purchasing behavior and people have great importance for green products [31]. The effects of green advertisement on the intentions of buying involve various psychological, social, and marketing factors. This paper explores how green advertisements influence consumers' purchase intentions for environment-friendly products, as well as the implication on the business world and sustainability ventures. Awareness about green product offers is created and raised through green advertisements [63]. They inform the customer regarding availability of environmentally friendly alternatives and educate the customers about the environmental value added. Higher awareness usually contributes to enhance consumer knowledge of how product impacts the environment and consequently better understanding of issues pertaining to sustainability [41]. Green advertisement serves to influence consumer attitude towards perception of green goods. It creates an excellent impression about sustainability because such advertisements make the product carry features and benefits which happen to be environmentally friendly. Such favorable perceptions of green products, shaped by advertising, is one of the most significant predictors of consumers' purchasing intentions toward such a product [39]. A credible image can enhance the likelihood of consumers to buy green products that are considered to be highly dedicated to sustainability [34]. Consumers may support brands whose mission aligns with them and whose efforts are made in a good faith effort to address environmental problems [27]. The effect might be accretive in terms of how consumption preferences are shifted to consume greater sustainability in both products and practices toward more long-term sustainability goals. Businesses that use green advertising successfully align themselves to consumer values and educate their consumers on sustainable choices to have a positive impact as well [46].

Eco-branding and eco-labelling significantly influence driving green purchase intentions in China so confirming the Hypotheses 2 and 3. The growing environmental awareness of consumers has provided an important trending behavior to buy green products [55]. This changed behavior has motivated the implementation of eco-branding and labeling as a strategic marketing tool by companies to highlight their efforts to ensure sustainability and friendliness to the environment. These companies adopt these strategies to support themselves with the increasing green revolution movement, thus showing their support for environmental responsibility and capturing environmentally conscious consumers [31, 44]. Such strategies often involve the prominent use of eco-labels and certifications such as organic, Fair Trade, or Energy Star that have become visible symbols of adherence to sustainable practices [52]. Brands focus on concerns towards environmental conservation, resource preservation, reduction of wastage, and supporting causes for the conservation through focused marketing communications and campaigns [39]. Eco-branding and eco-labelling greatly contribute to building consumer trust between the consumer and the brand. Consumers build trust in companies on sustainability commitments through such ongoing manifestations that allow consumers to build trust in the environmental claim made by firms, which results in decision to make green buying by consumer [22]. Second, as consumers feel that sustainability featured eco-branded products can contribute to greater value-added goods, it would enable more justifiable price tags, then reinforce the green intentions in purchasing. Such methods become effective and at the same time give way to competitive advantage upon implementing these as it talks with a growing market concerned by such environmentally friendly consumers [51]. It brings about increased perceived value and aligns with the values of conscious consumers. Finally, the future of eco-branding rests in the change that can be wrought upon the environment and in the flexibility of the ability to shift in tandem with the minds in constant flux [35].

As consumers of today are getting conscious about an environmentally aware society, their propensity for choosing green choices has been growing steadily. A very

intriguing factor driving these green purchase intentions is consumer innovativeness-the willingness of consumers to adopt new ideas or products [40]. This discussion will be dealing with the relationship between consumer innovativeness and how it deeply affects green purchase intentions. Our research reveals an imperative relationship between high consumer innovativeness and positive purchase intentions, confirming the hypothesis 4. This might be because people who were ecologically friendly or had preferences for ecologically friendly goods or services were ahead of the curve and, thus participate in environmental conservation activities [33]. Based on this, our study concludes that creating advertisements appealing to consumers' need to stay ahead of the curve builds positive and effective eco-friendly behavior as well as encourages the purchasing of environmentally friendly products [61]. Innovative consumers are highly experimental with new and environment-friendly products, which deeply influences their intentions to adopt green choices [18]. Furthermore, innovative consumer tendencies prompt them to search for unconventional, more environmentally friendly alternatives to existing products [47]. This search often ends with the discovery and subsequent adoption of environmentally friendly choices, which, in turn, influence green purchase decisions. Additionally, there is a choice of brands that innovate and provide new, eco-friendly solutions if one values being innovative. Innovative consumers are therefore likely to patronize and buy their goods from such brands [56]. Further, the experience of sharing environmentally friendly innovation habits with social networks has a strong influence on similar decisions of imitating the same green behaviors from others.

The study establishes that environmental knowledge acts as a mediator in relation between green advertisements and consumers' purchasing intentions of environment-friendly products so Hypothesis 5 is confirmed. Companies today require more reliance on green advertisements when selling green products and using eco-friendly practices in environmentally conscious societies [28]. However, the effect of advertising that appeals to consumers' attitudes and decisions to buy green depends on different factors. These include, in fact, consumers' degrees of environmental knowledge levels [58]. It goes without saying that green advertisement plays an important role as the main communication channel of environmental programs for a brand and environmental-friendly goods [37]. The better the environmental knowledge of consumers, the better they understand and process the information given towards more rational purchasing intentions of green products. Exposure to green advertisements also significantly influences the attitudes of consumers toward sustainability and eco-friendliness [31]. The role of environmental knowledge is important as a mediator because it forms the attitudes and subsequently influences green purchase intentions [41]. Environmental knowledge increases consumers' perceived value associated with green products as well as the practices associated with green products advertised in advertisements [55]. As a matter of fact, although consumers are aware of what type of environmental benefits and what significance it holds, they are more likely to make stronger purchase intentions related to green products [51]. Companies can influence consumers to purchase better products that will, in the long run, aid in achieving a sustainable future through the effective distribution of green advertisements with credible and accurate information [62].

While the study provides significant insights into green advertising, environmental knowledge, and purchasing behavior within the Chinese context, it is crucial to assess the potential variations in these dynamics across different cultural or geographic regions. Several cultural factors, such as individualism vs. collectivism, environmental awareness, and attitudes toward sustainability, can influence how green advertising impacts purchasing behavior. In collectivist cultures like China, green advertisements often align with societal values, appealing to the collective responsibility for environmental conservation. However, in individualistic cultures, such as the United States or many European nations, green advertising may need to emphasize personal benefits and individual contributions to sustainability. Future research could explore whether the focus of green advertisements on societal vs. personal benefits impacts purchasing intentions differently across these cultural dimensions. Moreover, the link between consumer innovativeness and green purchasing intentions could depend on cultural openness to new ideas and technologies.

Conclusions

This research explores effect of green advertisement on buying intentions of consumers for green products in China. This research also explored the impact of green advertisement, eco-labelling, eco-branding, and consumer innovativeness on green purchase intentions by examining the moderating impact of environmental knowledge in this relationship. The findings show that green advertisement, eco-branding, and eco-labelling has significant contribution in green buying intentions of consumers. In particular, environmental knowledge has significant mediation in relation of green buying intentions and green advertisement.

Theoretical implications

The theoretical implications of this research offer some insights for academic and practical areas. It would contribute to understand the consumer behavior theories

like TPB, which indicates that subjective norms, attitudes, and perceived behavioral control have an influence on intentions of people. In this regard, environmental knowledge is investigated as a mediator within this framework. This contributes to a growing literature regarding mediating variables in consumer behavior, further considering the role of information and knowledge in decision making. It elaborates the process by which consumers decode and interpret information received in green advertising and how this information might influence their choices. The emphasis is laid on the environmental knowledge to determine the behavior of a consumer. This indicates the role of consumer education and awareness in influencing sustainable choices. The study adds to the theories of sustainability through the role that knowledge dissemination via advertising plays in influencing sustainable consumption behavior. It may be consistent with the principles of sustainable development and consumer involvement in sustainability efforts. The study provides theoretical underpinning for long-term behavior change theories. It could underpin the concept that environmental awareness developed through green advertising leads to pro-environmental behavior. It contributes to broader academic understanding of how information and knowledge dissemination through advertising can be used to shape consumer choices and support sustainability goals.

Practical implications

The study also has several practical implications that can be valuable for businesses, advertisers, policymakers, and environmental organizations. Firms and environmental organizations can invest in consumer education and awareness programs to increase environmental knowledge. Secondly, advertisers can refine their message content to highlight the environmental attributes of products more effectively. Thirdly, advertisers and brands can prioritize transparency and authenticity in their green advertising efforts. Building trust and credibility through accurate and reliable information can help foster stronger connections with consumers. Lastly, organizations and governments can use the study's implications to support long-term sustainability goals. The firms aiming to affect the environmental conscious consumers, green advertisements should:

- Include clear, verifiable claims about environmental benefits, such as certifications. Avoid vague claims to maintain consumer trust.
- Design eco-labels that are easy to understand, with universally recognizable symbols. For example, icons that denote "biodegradable" or "energy-efficient" can simplify consumer decision-making.
- Work with third-party organizations to certify products, ensuring credibility and aligning with international standards.
- Consistently communicate sustainability commitments across marketing channels, reinforcing the brand's eco-friendly image. Aligning product designs, packaging, and branding with sustainability themes (e.g., minimalistic, biodegradable packaging) can strengthen consumer perceptions.
- Introduce tax benefits, subsidies, or reduced tariffs for companies that adopt eco-friendly practices, including eco-labelling and branding.
- Partner with businesses and NGOs to launch public campaigns highlighting the importance of eco-labels and sustainability certifications, thereby increasing consumer demand for green products.

Limitations

- The study is conducted in the Chinese context, which is a collectivist culture. The findings may not be generalizable to individualistic cultures, where consumer behaviors and motivations for purchasing green products might differ significantly.
- The study focuses exclusively on China, potentially overlooking regional variations within the country or insights from other countries that could influence the applicability of the findings.
- While the study highlights the impact of green advertisements, it might underexplore other critical factors influencing green purchasing behavior, such as price sensitivity, product availability, or consumer income levels.
- Self-reported data on green purchasing intentions may be subject to social desirability bias, where participants provide responses they perceive as socially or environmentally acceptable rather than their true behavior.
- The study does not account for long-term effects of green advertisements on purchasing behavior, limiting its ability to assess whether the observed changes in behavior are sustained over time.

These limitations could serve as a basis for future research to address gaps and improve the robustness of findings across different contexts.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40359-025-02538-x.

Supplementary Material 1

Acknowledgements
N/A.

Author contributions
D.L. conceptualized, made empirical analysis and wrote the manuscript.

Funding
This paper is funded by the 2019 Henan Province Higher Education Teaching Reform Research & Practice Project, Research and Practice on the Integration of Innovation and Entrepreneurship Education and Professional Practice Teaching System in Higher Vocational Institutions --- Taking Marketing Major as an Example, (Project No.: 2019SJGLX619).

Data availability
Data is available on request from the author with undue reservation.

Declarations

Ethics approval and consent to participate
The study is conducted in accordance with the Declaration of Helsinki and Human Research Ethics Committee of Shangqiu Polytechnic approved the study.

Consent for publication
N/A.

Competing interests
The authors declare no competing interests.

Consent to participate
A written informed consent to participate in the study was gained from the respondents.

Received: 6 November 2024 / Accepted: 24 February 2025
Published online: 09 March 2025

References

1. Asante A, Wang Y, Xu C, Chen F. Influence of eco-labeling and green advertising on consumers' green purchase intentions. Int J Environ Res Public Health. 2022;19(3):1653.
2. Li M, Liu S, Zhang J. Green advertising and its effects on consumer attitudes towards sustainable products. J Clean Prod. 2023;380:135072.
3. Zhu H, Kim M, Choi YK. Social media advertising endorsement: role of endorser type and message appeal in eco-product marketing. Int J Advert. 2022;41(5):948–69.
4. Goyal A, Kaushal K. Exploring green advertisement's role in sustainable consumer behavior in emerging economies. Sustainability. 2023;15(8):4280.
5. Alam AS, Nor NM. Mediating role of green trust in the relationship between green advertising and purchase intention. J Promot Manag. 2022;28(2):115–30.
6. Xie S, Madni GR. Impact of social media on youth's green consumption through perceived environmental value. Sustainability. 2023;15(4):3739.
7. Teguh AS, Ignatia MH. Effect of green advertising on purchase intentions with trust as a mediating factor. J Mantik. 2022;6(3):1291–300.
8. Miller B, Sinclair J. Community stakeholder responses to advocacy advertising. J Advert. 2009;38(2):37–52.
9. Wang J, Li Y, He Z. Exploring benefit framing and eco-product promotions in urban contexts. Energy Policy. 2023;169:113147.
10. Sun Y, Luo B, Wang S. Influence of green advertisements on consumer intentions to purchase eco-labeled products. Bus Strat Environ. 2023;30(1):694–704.
11. Shuwang Z, Madni GR, Yasin I. Social capital's role in green advertising and organizational sustainability. Sustainability. 2022;14(10):11858.
12. Wijekoon R, Sabri MF. Determinants influencing green purchase intention: A guiding framework. Sustainability. 2023;15(3):6219.
13. Yoon HJ, Kim YJ. Green advertising and behavioral intentions: A health belief model approach. J Promot Manag. 2022;25(2):49–70.
14. Yue T, Long R, Chen H. Multi-agent simulation of green behavior. J Clean Prod. 2023;256(4):119752.
15. Pancić M, Serdarušić H, Ćućić D. Green advertisement and its impact on repurchase intentions. Sustainability. 2023;15(16):12534.
16. Yin H, Ma C. International integration and green marketing efforts in China. Int Mark Rev. 2022;26(3):348–67.
17. Steg L, Vlek C. Review of pro-environmental behavior models in advertising research. J Environ Psychol. 2022;33(4):309–17.
18. Suki NM, Azman NS. Green marketing awareness and its effect on consumer purchase intentions. Procedia Econ Finance. 2023;45(2):262–8.
19. Yadav R, Pathak GS. Theory of planned behavior and green product intentions in youth. J Clean Prod. 2023;145:732–9.
20. Zhang P, Shi X. Impact of energy-efficiency labels on green product purchase. Energy Policy. 2023;242(1):118555.
21. Zhang Y, Xiao C, Zhou G. Consumer willingness to pay for green products. J Clean Prod. 2023;128:276–89.
22. Casu G, Gremigni P. Mediating effect of green trust in advertising skepticism and purchase intention. Int J Environ Res Public Health. 2022;19(24):16757.
23. Banerjee S, Gulas CS, Iyer E. Shades of green: A multidimensional analysis of environmental advertising. J Advert. 1995;24(2):21–31.
24. Liu W, Wang Q. Interaction effects of green advertising strategies and knowledge levels. Energy Policy. 2023;166:113015.
25. Yang JJ, Han SH, Lee YK. Consumer innovativeness and eco-friendly purchase intentions. Korean J Bus Adm. 2023;28(4):1826–35.
26. Hussain A, Ting DH. Co-creation in green advertisement strategies and consumer values. Front Psychol. 2022;13:800206.
27. Kao TF, Du YZ. Eco-emotions in green advertising: effects on purchase intention. J Clean Prod. 2022;242:118294.
28. Klöckner CA. Meta-analysis of green consumer behavior in advertising contexts. J Clean Prod. 2022;268:122019.
29. Appiah MO. Investigating the multivariate Granger causality between energy consumption, economic growth and CO2 emissions in Ghana. Energy Policy. 2018;112(1):198–208.
30. Czarnecka B, Schivinski B, Keles S. How values of individualism and collectivism influence impulsive buying and money budgeting: the mediating role of acculturation to global consumer culture. J Consum Behav. 2020;19:505–22.
31. Czarnecka B, Schivinski B. Individualism/collectivism and perceived consumer effectiveness: the moderating role of global–local identities in a post-transitional European economy. J Consum Behav. 2021;21(2):180–96.
32. Kao T-F, Du Y-Z. A study on the influence of green advertising design and environmental emotion on advertising effect. J Clean Prod. 2020;242:118294.
33. Khare A. Antecedents to green buying behaviour: A study on consumers in an emerging economy. Mark Intell Plan. 2015;33(3):309–29.
34. Dhir A, Talwar S, Sadiq M, Sakashita M, Kaur P. Green apparel buying behaviour: A stimulus–organism–behaviour–consequence (SOBC) perspective on sustainability-oriented consumption in Japan. Bus Strateg Environ. 2021;30:183–204.
35. Ducoffe RH. Advertising value and advertising on the web. J Advert Res. 1996;36:21–1.
36. Gómez-Carmona D, Muñoz-Leiva F, Liébana-Cabanillas F, et al. The effect of consumer concern for the environment, self-regulatory focus and message framing on green advertising effectiveness: an eye tracking study. Environ Commun. 2021;15:813–41.
37. Kim W-H, Malek K, Roberts KR. The effectiveness of green advertising in the convention industry: an application of a dual coding approach and the norm activation model. J Hosp Tour Manag. 2019;39:185–92.
38. Wijekoon R, Sabri MF. Determinants that influence green product purchase intention and behavior: A literature review and guiding framework. Sustainability. 2021;13(11):6219.
39. Zhang Y, Xiao C, Zhou G. Willingness to pay a price premium for energy-saving appliances: role of perceived value and energy efficiency labeling. J Clean Prod. 2020;242(1):118555.
40. Zhu H, Kim M, Choi YK. Social media advertising endorsement: the role of endorser type, message appeal and brand familiarity. Int J Advert. 2022;41:948–69.
41. Klöckner CA. A comprehensive model of the psychology of environmental behaviour—A meta-analysis. Glob Environ Chang. 2013;23:1028–38.
42. Luo B, Sun Y, Shen J, et al. How does green advertising skepticism on social media affect consumer intention to purchase green products? J Consum Behav. 2020;19(4):371–81.
43. Madni GR. Meditation for role of productive capacities and green investment on ecological footprint in BRI countries. Environ Sci Pollut Res. 2023;30(28):72308–18.

44. Mansoor M, Paul J. Mass prestige, brand happiness and brand evangelism among consumers. J Bus Res. 2022;144:484–96.
45. Nur F, Akmaliah N, Chairul R, Safira S. Green purchase intention: the power of success in green marketing promotion. Manag Sci Lett. 2021;11:1607–20.
46. Shuwang Z, Madni GR, Yasin I. Exploring the mutual nexus of social capital, social innovations and organizational performance. Sustainability. 2022;14:11858.
47. Suki NM, Suki NM. Examination of peer influence as a moderator and predictor in explaining green purchase behavior: A developing country. J Clean Prod. 2019;228:833–44.
48. Suki NM, Suki NM, Azman NS. Impacts of corporate social responsibility on the links between green marketing awareness and consumer purchase intentions. Procedia Econ Finance. 2016;37:262–8.
49. Sun Y, Luo B, Wang S, et al. What you see is meaningful: does green advertising change the intentions of consumers to purchase eco-labeled products? Bus Strateg Environ. 2020;30(1):694–704.
50. Xie S, Madni GR. Impact of social media on young generation's green consumption behavior through subjective norms and perceived green value. Sustainability. 2023;15:3739.
51. Okada EM, Mais EL. Framing the green alternative for environmentally conscious consumers. Sustain Acc Manag Policy J. 2010;1(2):222–34.
52. Park J, Ha S. Understanding consumer recycling behavior: combining the theory of planned behavior and the norm activation model. Fam Consum Sci Res J. 2014;42(3):278–91.
53. Patel C, Chugan PK. The influence of consumer perception towards green advertising on green purchase intention. Int J Entrep Bus Environ Perspect. 2015;4:1865–73.
54. Pittman M, Oeldorf-Hirsch A, Brannan A. Green advertising on social media: brand authenticity mediates the effect of different appeals on purchase intent and digital engagement. J Curr Issues Res Advert. 2022;43:106–21.
55. Rahman ASMS, Barua A, Hoque R, Zahir R. Realistic study on Bangladesh influence of green marketing on consumer. 2017;17(1).
56. Rashid NA. Awareness of eco-label in Malaysia's green marketing initiative. Int J Bus Manag. 2009;4(8):132–41.
57. Schmuck D, Matthes J, Naderer B. Misleading consumers with green advertising? An affect–reason–involvement account of greenwashing effects in environmental advertising. J Advert. 2018;47(2):127–45.
58. Suki NM. Green product purchase intention: impact of green brands, attitude, and knowledge. Br Food J. 2016;118(12):2893–910.
59. Teguh AS, Ignatia MH. The effect of green advertising and green product on green purchase intention with green trust as mediation variable on consumers of water packaging Ades in Surabaya. J Mantik. 2022;6:1291–300.
60. Usrey B, Palihawadana D, Saridakis C, Theotokis A. How downplaying product greenness affects performance evaluations: examining the effects of implicit and explicit green signals in advertising. J Advert. 2020;49:125–40.
61. Wang J, Li Y, He Z, et al. Scale framing, benefit framing and their interaction effects on energy-saving behaviors: evidence from urban residents of China. Energy Policy. 2022;166:113005.
62. Yue T, Long R, Chen H, et al. Energy-saving behavior of urban residents in China: A multi-agent simulation. J Clean Prod. 2020;252(4):119623.
63. Zhang P, Shi X, Sun Y, et al. Have China's provinces achieved their targets of energy intensity reduction? Reassessment based on nighttime lighting data. Energy Policy. 2019;128(5):276–83.

Publisher's note