

THE IMPACT OF ENVIRONMENTAL KNOWLEDGE, ENVIRONMENTAL ATTITUDES, AND SUBJECTIVE NORMS ON COLLEGE STUDENTS' GREEN PURCHASE INTENTION

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Abstract

This study aims to examine the effects of environmental knowledge, environmental attitudes, and subjective norms on Chinese college students' green purchase intention, utilizing the Theory of Reasoned Action. Data were collected from 328 respondents through questionnaires and analyzed quantitatively using the partial least squares method. The findings reveal that environmental knowledge has a significant and positive impact on green purchase intention, environmental attitudes, and subjective norms. Furthermore, environmental attitudes and subjective norms significantly and positively influence green purchase intention. This study provides valuable insights for companies aiming to market green products in China and for the government and educational institutions to enhance the promotion of environmental knowledge, thereby increasing college students' environmental awareness and green purchase intention.

Keywords: Green Purchasing Intention, Environmental Knowledge, College Students, Chinese Market, PLS-SEM.

1. INTRODUCTION

Since the 1980s, the global industrialization process has been advancing rapidly, and a series of problems such as resource shortage, environmental pollution, global warming, and the destruction of biodiversity have become more and more prominent, even affecting the life of human beings (Singh et al., 2022).

Faced with numerous environmental issues, countries worldwide have put forward sustainable development strategies to achieve coordinated development between the economy and society, as well as between humans and nature. In pursuing a sustainable economy, individuals increasingly recognize that environmental issues stem from elevated levels of unsustainable consumption (Cong Doanh et al., 2021).

Consumers can help the environment by choosing eco-friendly products that prevent or reduce environmental harm (Wijekoon & Sabri, 2021), environmentally friendly consumption or green purchasing has been created as a new concept in the marketing literature. Even though consumers express concern about environmental issues and hold a favorable attitude towards sustainable development and green products, the increase in purchases of green products is not significant, and the market share of green products is still limited to 7-8% of the global market (Wijekoon & Sabri, 2021).

These noteworthy problems have prompted scholars to explore further the driving factors of green purchase intention (Moslehpour et al., 2023).

Based on the Theory of Reasoned Action (TRA) model, this thesis deeply studies the impact of environmental knowledge on college students' green purchase intention. This research not only helps to enrich and develop related theories but also can provide practical guidance for improving college students' green purchasing willingness, promoting the popularization of green consumption education, and improving the marketing effect of enterprises' green products, which is of great theoretical significance and practical significance.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Underpinnings Theoretical

The Theory of Reasoned Action (TRA), introduced by social psychologists Martin Fishbein and Icek Ajzen in 1975, serves as a theoretical framework designed to elucidate and forecast an individual's attitudes and behavioral intentions regarding specific behaviors (Ajzen & Fishbein, 1975). The core concepts of TRA include attitudes, subjective norms, and behavioral intentions (Hale et al., 2002).

Firstly, attitudes refer to the subjective evaluation of a particular behavior, shaping an individual's tendency towards specific actions. Secondly, subjective norms denote the influence of perceived social pressure or the expectations of others on individual behavior. By analyzing individuals' attitudes and subjective norms towards specific behaviors, researchers can predict and explain their behavioral intentions, thus providing a theoretical foundation for designing intervention measures and fostering social change (S. Kumar et al., 2023).

2.2 Green Purchase Intention

Consumer behavior experts Ajzen and Fishbein (1975) first proposed the concept of purchase intention, pointing out that purchase intention is the probability of consumers purchasing a particular product or service. Within the framework of the theory of planned behavior, behavioral intention signifies the extent to which an individual is inclined to participate in a particular behavior and the level of effort they are prepared to invest in it (Ajzen, 1991).

Green purchase intention pertains to customers' inclination to buy environmentally friendly products while avoiding products that may be detrimental to the environment (Moslehpour et al., 2023).

From the psychological perspective, scholars believe that purchase intention is the performance of consumers at the psychological level and the internal tendency of individual behavior, which is formed under the comprehensive influence of various internal and external factors (Tarabieh, 2021).

From a behavioral perspective, green purchase intention supports consumer purchasing behavior and constitutes a crucial stage in consumers' decision-making process (Ahmad et al., 2023). Purchase intention has been widely studied as an essential variable to measure an individual's possible purchasing behavior.

2.3 Environmental Knowledge

Environmental knowledge is the ability of an individual to recognize a set of facts, concepts, and behaviors related to the environment (Cong Doanh et al., 2021). Environmental knowledge is an individual's understanding of the elements, fundamental relationships, and environmental responsibilities of sustainable development (Zahan et al., 2020).

As far back as the 1990s, Ellen (1994) categorized environmental knowledge into two distinct types for measurement: subjective knowledge and objective knowledge.

Subjective knowledge refers to an individual's self-assessment of environmental phenomena and their impacts on humans and wildlife. In contrast, objective knowledge is based on factual information derived from personal observations or concrete evidence (Chanda et al., 2023).

However, when gauging consumer attitudes toward green products, subjective knowledge regarding environmental issues takes precedence over objective knowledge (Jaiswal & Kant, 2018). Therefore, this paper measures consumer environmental knowledge based on subjective knowledge.

Most scholars emphasize that individuals with greater environmental knowledge are more likely to engage in environmentally conscious behavior (Rusyani et al., 2021). Cong Doanh et al. (2021) employed structural equation modeling to investigate the antecedents of green purchase intention in a cross-cultural context and suggested a positive correlation between environmental knowledge and green purchase intention (G. A. Kumar, 2021). Accordingly, we make the following hypothesis:

H1: Environmental knowledge has a significant positive impact on college students' green purchase intention.

Environmental knowledge is critical to an individual's attitude and willingness, and customers' positive attitudes toward the environment are enhanced when they gather essential knowledge about the environment from reality (Lavuri et al., 2022). Shah et al. (2021) analyzed the determinants of consumers' willingness to adopt 5G services, noting that environmental knowledge significantly influences attitudes and further behavioral intentions.

Lavuri and Susandy (2020) found that environmental knowledge is significantly related to environmental attitudes; the more environmental knowledge consumers have, the more aware they are of environmental protection and the more positive environmental attitudes they exhibit. Consequently, we formulate the following hypothesis:

H2: Environmental knowledge has a significant positive impact on environmental attitudes.

Consumers with more environmental knowledge are more sensitive to the technological and environmental backwardness of the products and the social pressure they will inevitably incur (Lao, 2013). People may try to appear to know a lot about environmental issues when they believe others want them to know about them.

Environmental knowledge raises people's awareness of environmental issues, which in turn raises their altruism and ecological values, and perceived social pressures and ecological values motivate people to act in favor of the environment (Wang & Lin, 2020). Qureshi et al. (2023) revealed that environmental knowledge positively and significantly influences subjective norms. Accordingly, we make the following hypothesis:

H3: Environmental knowledge has a significant positive impact on subjective norms.

2.4 Environmental Attitude

Attitude refers to an individual's favorable or unfavorable appraisal of a specific behavior (Ajzen, 1991). In the environmental field, some scholars have defined attitude as an environmental disposition reflecting an individual's concern for the environment, which ultimately manifests through environmental behavior. Cruz and Manata (2020) considered environmental attitudes as positive or negative evaluations and perceptions of specific environmental topics.

The terms "environmental attitudes" and "environmental concerns" are often used interchangeably to assess the state of the environment. Some scholars have measured attitudes in terms of environmental concern. Dunlap and Van Liere (1978) created the New Environmental Paradigm Scale (NEP). Later, Dunlap et al. (2000) later revised the scale to form the New Environmental Paradigm Scale (NEP). Chinese scholars revised the NEP scale according to the Chinese situation and proposed a 10-item Chinese version of the CNEP scale (Hong et al., 2014).

In examining individual environmental behavior, environmental attitudes represent an individual's subjective inclination towards a specific environmental willingness and behavior. It is a pivotal factor in investigating elements influencing environmental behavior (Dhir et al., 2021).

People with positive environmental attitudes tend to buy eco-friendly products. In a research conducted in Egypt, consumers' environmental attitudes influenced both green purchase intentions and behaviors (Mostafa, 2007). Based on these findings, the following hypothesis is formulated in this research:

H4: Environmental attitudes have a positive influence on green purchase intention.

2.5 Subjective Norms

Ajzen (1991) defined subjective norms as individuals feeling external pressures and behaving accordingly. Subjective norms are external pressures exerted on consumers by society, peers, family, and friends to perform or not to perform specific behaviors. This pressure may lead to positive or negative behaviors (Qureshi et al., 2023).

Hence, the measurement of subjective norms can be gauged by the degree of social pressure an individual might encounter (Chanda et al., 2023). Subjective norms are important variables that influence green purchase intention (Ali et al., 2022). Numerous scholars have explored the relationship between subjective norms and behavioral intentions.

The results consistently indicate a positive and significant impact of subjective norms on behavioral intentions. Subjective norms significantly influence the inclination to purchase organic food, moderating the relationship between attitudes, perceived behavioral control, and the willingness to make a purchase (Al-Swidi et al., 2014).

The study's results on influencing the purchase intention of green products among young people in India showed that subjective norms and perceived behavioral control had a significant effect on green purchases (Muhammad, 2018). Subjective norms have a positive effect on the purchase intention of green skin care products (Pang et al., 2021). Accordingly, we make the following hypothesis:

H5: Subjective norms have a positive influence on green purchase intention.

2.6 Research model

Based on the literature review and research hypotheses, the conceptual model of this paper is shown in Figure 1.

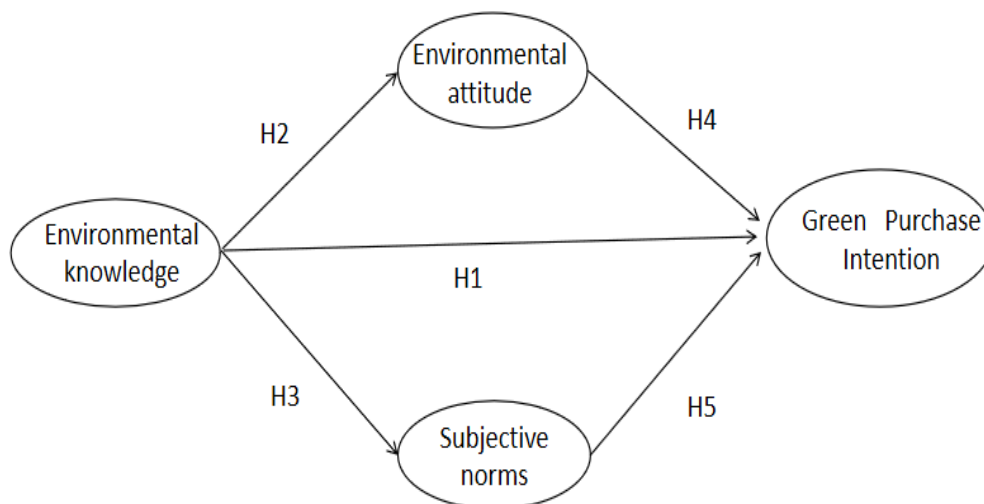


Figure 1: Conceptual model

3. METHODOLOGY

3.1 Participants and sample design

The population of this thesis is the college students enrolled in all general colleges and universities in Liuzhou City, Guangxi, in 2024. The researchers utilized the online questionnaire platform "Questionnaire Star" to gather data. We distributed the questionnaire to 380 students and obtained 344 responses, resulting in a response rate of 90.53%. In addition, 16 responses were removed during the data screening process due to missing or outlier values. The final sample size of the study was 328. According to the criteria provided by Hair et al. (2017) and Comrey and Lee(2013), a sample size of 300 is considered acceptable, and the sample size of this study meets the requirements.

3.2 Demographics

The demographics are detailed in Table 1. The data was collected from 128 males and 200 females, most of whom were between the ages of 18 and 20, representing approximately 63.41% (328 participants) of the total sample. Most students were from the pharmaceutical sciences, accounting for 34.76%, followed by engineering and technological sciences at 32.32%, and humanities and social sciences at 24.39, reflecting the popularity or availability of these disciplines in the participating universities.

Additionally, Table 1 included information on the student's grades and cost of living. Most of the student's cost of living was concentrated in the 1000-1500 CNY (64.33%), indicating that fewer students had more financial resources, which may affect their consumption behavior, including green consumption.

Table 1: Sample Demographic (n=328)

Demographic Variable	Category	Frequency	Percentage
Gender	Male	128	39.02%
	Female	200	60.98%
Age	1- 17	5	1.53%
	18-20	208	63.41%
	21-22	111	33.84%
	>22	4	1.22%
Grade	Grade1	98	29.88%
	Grade2	131	39.94%
	Grade3	65	19.82%
	Grade4	34	10.36%
Discipline type	Natural sciences	15	4.57%
	Agricultural sciences	13	3.96%
	Pharmaceutical sciences	114	34.76%
	Engineering and technological sciences	106	32.32%
	Humanities and Social Sciences	80	24.39%
Cost of living	<1000 CNY	53	16.16%
	1000-1500 CNY	211	64.33%
	1501-2000 CNY	53	16.16%
	2001-2500 CNY	4	1.22%
	2501-3000 CNY	3	0.91%
	>3000 CNY	4	1.22%

Source(s): Table by authors

3.3 Measurement

The measurement scales utilized in this study are derived from previously validated instruments, and the questionnaire items were based on a five-point Likert scale. Green purchasing intention, which consisted of 5 items, was taken from the studies of Zahan et al.(2020) and Sultana et al.(2022). The measure of environmental knowledge consisted of 5 items and was mainly taken from the studies of (Jaiswal & Kant, 2018; Mostafa, 2007). The measurement of environmental attitudes drew on the research (Dunlap & Jones, 2002; Hong et

al., 2014). To ensure that the NEP scale can be used in China, this dissertation used the Chinese version of the CNEP scale, including 10 question items, which had been validated by other scholars (Zhou et al., 2022). The subjective norms scale, consisting of 5 items, was taken from a study by (Zahan et al., 2020).

4. DATA ANALYSIS AND RESULTS

We used partial least squares (PLS) modeling with SmartPLS 4 (Ringle et al., 2024) to examine the measurement and structural models. This approach was chosen because PLS does not require the assumption of normality, which is suitable for survey research that typically does not follow a normal distribution (Hair et al., 2022). The PLS-SEM process involves two main steps: the measurement and structural models.

4.1 Common method variance

Since the data was collected from a single source, we first addressed the issue of Common Method Bias by following the recommendation of Kock (2015), using full collinearity testing. In this method, all variables are regressed against a common variable, and if $VIF \leq 3.3$, it indicates that there is no significant bias from the single-source data. Our analysis yielded VIF values less than 3.3, indicating that single-source bias is not a significant issue with our data, as shown in Table 2.

Table 2: Full Collinearity Testing

Environmental Knowledge	Environmental Attitudes	Subjective Norms	Green Purchase Intention
1.709	1.658	2.171	2.394

4.2 Measurement Model

A reflective measurement model is evaluated using several criteria: indicator reliability, internal consistency reliability, convergent validity, and discriminant validity (Hair et al., 2022). The results of executing the PLS-SEM algorithm program are shown in Figure 2. The values of loadings should be greater than 0.5, and ideally, more than 0.7 (Hair et al., 2022), the average variance extracted (AVE) should be ≥ 0.5 , and the composite reliability (CR) should be ≥ 0.7 (Hair et al., 2019). As shown in Table 3, the AVEs are all higher than 0.5, and the CRs are all higher than 0.7. Figure 2 and Table 3 demonstrate that the outer loadings range from 0.702 to 0.905, indicating adequate levels of indicator reliability. We evaluated the HTMT criterion for discriminant validity, proposed by Henseler et al. (2015) and later refined by Franke and Sarstedt (2019). The HTMT values should be ≤ 0.85 for the stricter criterion and ≤ 0.90 for the more lenient criterion. As presented in Table 4, the values of HTMT are less than 0.85, indicating that respondents perceived the four constructs as distinct. Taken together, these validity tests demonstrate that the measurement items are both valid and reliable.

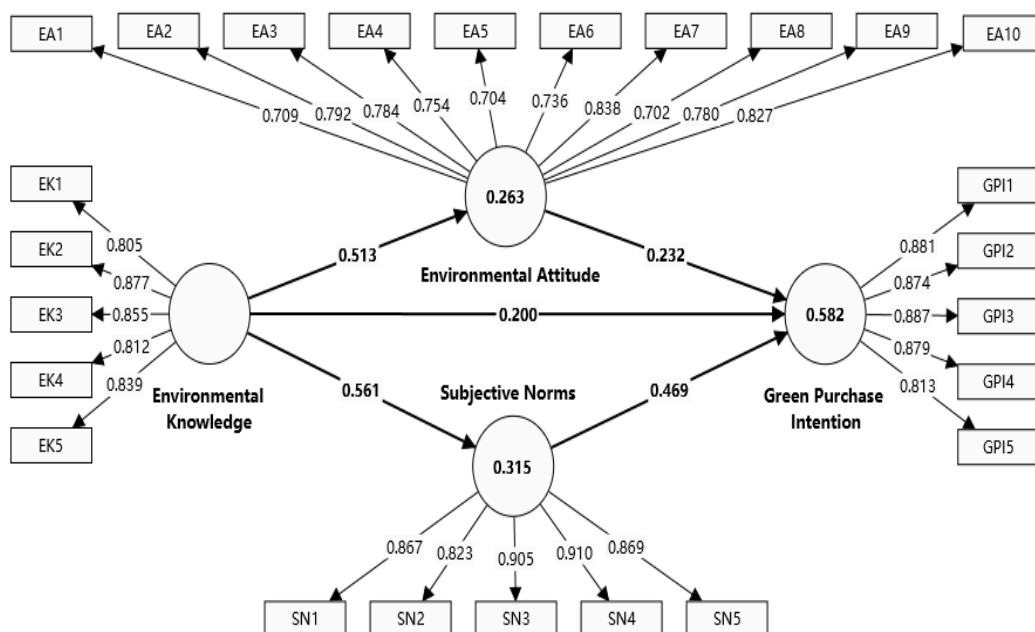


Figure 2: Conceptual model results

Table 3: Measurement model results

Constructs	Items	Loadings	AVE	CR
Environmental Knowledge	EK1	0.805	0.702	0.922
	EK2	0.877		
	EK3	0.855		
	EK4	0.812		
	EK5	0.839		
Environmental Attitudes	EA1	0.709	0.584	0.933
	EA2	0.792		
	EA3	0.784		
	EA4	0.754		
	EA5	0.704		
	EA6	0.736		
	EA7	0.838		
	EA8	0.702		
	EA9	0.78		
	EA10	0.827		
Subjective Norms	SN1	0.867	0.767	0.943
	SN2	0.823		
	SN3	0.905		
	SN4	0.91		
	SN5	0.869		
Green Purchase Intention	GPI1	0.881	0.752	0.938
	GPI2	0.874		
	GPI3	0.887		
	GPI4	0.879		
	GPI5	0.813		

Table 4: Discriminant Validity (HTMT)

Constructs	1	2	3	4
1. Environmental Knowledge				
2. Environmental Attitudes	0.561			
3. Subjective Norms	0.615	0.562		
4. Green Purchase Intention	0.641	0.631	0.758	

4.3 Structural Model

Once the measurement model assessment is deemed satisfactory, the subsequent step in evaluating PLS-SEM results involves assessing the structural model. According to Hair et al. (2022) suggestion, key assessment criteria to consider include the coefficient of determination (R^2), the blindfolding-based cross-validated redundancy measure (Q^2), and the statistical significance and relevance of the path coefficients. Additionally, researchers should evaluate the model's out-of-sample predictive power using the PLS predict procedure (Shmueli et al., 2016).

First, as Hair et al. (2022) and Cain et al. (2017) suggested, we assessed the multivariate skewness and kurtosis. Multivariate normal distributions are judged by multivariate skewness ≤ 3 and multivariate kurtosis values ≤ 20 (Kline, 2023). The results showed that our data were not multivariate normal, with Mardia's multivariate skewness ($\beta = 3.798$, $p < 0.01$) and Mardia's multivariate kurtosis ($\beta = 30.733$, $p < 0.01$). Consequently, adhering to Becker et al. (2023), we reported the path coefficients, standard errors, t-values, and p-values for the structural model using a 10,000-sample bootstrapping procedure.

Then, we utilized a 10,000-sample resampling bootstrapping procedure with a 5% significance level for one-tailed tests. Figure 2 presents the impact of the three predictors on green purchasing intention, resulting in an R^2 of 0.582, indicating that these predictors accounted for 58.2% of the variance in green purchasing intention. Environmental knowledge ($\beta=0.200$, $p<0.01$), environmental attitudes ($\beta=0.232$, $p<0.01$), and subjective norms ($\beta=0.469$, $p<0.01$) were all positively associated with green purchasing intention, thus supporting H1, H4, and H5.

Additionally, we tested the effect of environmental knowledge on environmental attitudes and subjective norms, yielding R^2 values of 0.263 and 0.315, respectively, as shown in Figure 2. This indicates that environmental knowledge explained 26.3% of the variance in environmental attitudes and 31.5% of the variance in subjective norms.

Table 5 further demonstrates that environmental knowledge has a significant and positive direct relationship with environmental attitudes ($\beta=0.513$, $p<0.01$) and subjective norms ($\beta=0.561$, $p<0.05$), thereby supporting H2 and H3. The 95% bootstrap confidence interval does not include zero, confirming our findings.

Table 5: Results of path analysis

Hypothesis	Relationship	Std Beta	Std Error	t-values	p-values	BCI LL	BCI UL	f ²
H1	EK -> GPI	0.200	0.053	3.799	p< 0.01	0.116	0.292	0.060
H2	EK -> EA	0.513	0.040	12.882	p<0.01	0.438	0.570	0.356
H3	EK -> SN	0.561	0.042	13.293	p< 0.01	0.484	0.624	0.459
H4	EA -> GPI	0.232	0.058	4.026	p<0.01	0.132	0.322	0.085
H5	SN -> GPI	0.469	0.063	7.497	p< 0.01	0.368	0.573	0.320

Note: We use 90% confidence interval with a bootstrapping of 10,000. EK = Environmental Knowledge, EA = Environmental Attitudes, SN = Subjective Norms, GPI = Green Purchase Intention

Finally, researchers need to evaluate the model's out-of-sample predictive power to ensure that a PLS path model is valuable for managerial decision-making (Chin et al., 2020). The primary method for this assessment is the PLSpredict procedure developed by Shmueli et al.(2016). We utilized PLSpredict with 10-fold cross-validation to simulate how the PLS model will predict new observations. The criterion for Q² indicated that the model had predictive relevance when Q²>0 (Hair et al., 2022). In the initial step, we observe that all indicators of the endogenous constructs outperform the naïve benchmark, as evidenced by Q² predict > 0. The results in Table 6 show that most of the metrics in the PLS-SEM analysis produced small prediction errors compared to the LM, which suggests that the present model has medium predictive power.

Table 6: PLS-Predict

Item	Q ² _predict	PLS	LM	PLS-LM
		RMSE	RMSE	
GPI1	0.211	0.627	0.624	0.003
GPI2	0.222	0.619	0.619	0.000
GPI3	0.290	0.610	0.612	-0.002
GPI4	0.265	0.618	0.622	-0.004
GPI5	0.257	0.790	0.801	-0.011

Note: GPI1, GPI2, GPI3, GPI4, and GPI5 are all green purchase intention items.

5. DISCUSSION AND CONCLUSIONS

This research has revealed that environmental knowledge significantly influences college students' green purchase intention (H1, $\beta=0.200$), demonstrating that individuals with more knowledge will be more aware of environmental issues, which in turn affects their willingness to purchase green purchases, corroborated by Cong Doanh et al.(2021). Additionally, environmental knowledge significantly affects environmental attitudes and subjective norms, with the path coefficients of $\beta=0.513$ (H2) and $\beta=0.561$ (H3). Environmental knowledge is closely related to environmental attitudes and subjective norms, and consumers with environmental knowledge are more environmentally aware, more sensitive to social pressures (Qureshi et al., 2023), and exhibit more positive environmental attitudes (Lavuri & Susandy, 2020). Furthermore, environmental attitudes and subjective norms are significantly associated

with GPI, with path coefficients of $\beta=0.232$ (H4) and $\beta=0.469$ (H5), respectively, supported by Pang et al.(2021). Therefore, social pressure and consumer attitudes towards the environment are critical factors in enhancing green purchasing intention in the Chinese market. The results of the above hypotheses demonstrate that possessing environmental knowledge not only directly increases consumers' willingness to purchase green products but also contributes to developing positive environmental attitudes and understanding of socially appreciated behaviors by consumers, motivating them to further engage in actions that contribute to environmental well-being. Therefore, green marketing campaigns should proactively provide facts and concepts about environmental issues, etc., in order to raise customers' environmental awareness and develop positive environmental attitudes. At the same time, the government and schools can also strengthen the publicity and education on environmental knowledge for college students, making them feel society's expectations of their behaviors and thus increase their green purchase intention.

Limitations and Future Directions

This study analyzes the effect of environmental knowledge, environmental attitudes, and subjective norms on college students' green purchase intention. Future research could incorporate variables such as socio-cultural factors, values, and social media to develop a more complex and comprehensive model. This study employed closed-ended questions in the questionnaire, limiting the depth of the information obtained. Future research could use open-ended questions and adopt mixed research methods to gain a more complete understanding of college students' green purchase intentions.

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