Impact of Emotional Perceptions and Social Influences on Green Consumption Practices in Vietnam

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Abstract: This study examines the impact of emotional perceptions and social influence on green consumption practices, with a focus on Vietnam. Conducted using a non-probability sampling method, the research drew upon responses from 548 Vietnamese consumers. The SmartPLS Software was employed for hypothesis testing. It was determined that attitudes towards green products and the appraisal of environmental threats positively influence green purchase behaviors. Moreover, the effect of both attitudes and threat appraisal on green purchasing behavior was found to be positively moderated by social influence. By incorporating the role of social influence, this research extends the protection motivation theory (PMT) and bridges the gap between perception, attitude, and behavior. The findings suggest managerial implications for companies marketing green products in Vietnam, highlighting strategies to enhance consumer engagement and purchase. This study not only sheds light on the intrinsic motivations behind green product purchases but also underscores the amplifying role of social contexts in environmental consumerism.

Keywords: Green products; Social influence; Protection motivation theory (PMT); Attitude-behavior-context (ABC) theory; SmartPLS

1. Introduction

Through observations, we can see the unprecedented negative changes in climate that have occurred over hundreds, even thousands, of years (IPCC, 2021). According to U.S. News & World Report, in 2023 alone, the world witnessed a series of natural disasters, such as two earthquakes in Syria and Turkey, resulting in over 50,000 fatalities, with losses in Turkey reaching up to 163 billion USD. Moreover, extreme droughts and heat waves have sparked forest fires in several countries, like Indonesia and Hawaii, destroying thousands of hectares of forests and agricultural land. Additionally, floods in Libya and many other places have caused severe damage, with thousands losing their lives and homes (Navarre, 2023). In 2023, NOAA reported that the concentration of CO_2 reached 419.3 parts per million, marking a 50% increase compared to the pre-industrial era and the third-highest increase in 65 years. The concentration of N_2O also reached a new high in 2022. This gas can persist in the atmosphere for up to 100 years, leading to consequences such as floods, droughts, extreme heat waves, and wildfires (Tam, 2024). These are the grim consequences of climate change. These findings motivate consumers to pursue environmental protection, such as through green consumption. Alam et al. (2023) suggest that environmental threats motivate the use and consumption of green products, encouraging the intention to use such products for environmentally friendly behavior. Besides, Büyükayman et al. (2022) suggest that health and environmental awareness motivate consumers to choose and use green products that are beneficial for both health and the environment. Thanks to the rapid development of green media technology, consumers have a better understanding of environmental protection behaviors (Ogiemwonyi et al., 2020). A new consumer culture has emerged, characterized by green shopping behaviors (Muresan et al., 2021).

According to a survey by Standard Insights (January 2023) in Vietnam with the participation of 1,140 people over 18 years old to research what they had done more frequently over the past month, the results showed that avoiding food waste is the top priority measure, with a rate of 63.20%. Next is energy saving, such as turning off lights when not in use, with a rate of 58.50%. In addition, many people also check product labels before purchasing (organic, all-natural, or non-toxic) with a rate of 34.02%, use refill or reusable items (29.77%), and select products with recyclable packaging (21.85%). These behaviors not only show the consumer's dedication to maintaining their well-being but also their deep concern for the environment. A survey by Price Waterhouse Coopers in 2023 found that over 93% of respondents would pay more for products made from recycled materials (Communist Party of Vietnam, 2023). This trend aligns with Vietnam's Green Growth Strategy from 2021 to 2030 and 2050, as stated in Vietnam's Prime Minister's Decision No. 1658/QD-TTg on October 1, 2021. NielsenIQ survey results from 2023 show that 59% of people regularly eat green vegetables and grains, 44% reuse clothes, 61% turn off electrical appliances when not in use, 39% limit packaged foods, 73% choose organic and natural foods, and 44% replace plastic bags with canvas bags (Trang, 2024). Therefore, marketing managers should focus on creating products that meet "green" and "clean" criteria to encourage consumers to use eco-friendly products, increasing sales and profits.

Many marketing experts have studied the behavior of consumers who purchase green or environmentally friendly products by applying the theory of planned behavior (TPB) and the ABC theory. These theories focus on predicting and explaining consumer behavior while also gaining a better understanding of human behavior. One of the theories applied to explain behavior is the PMT, aimed at predicting protective behaviors based on fear arousal. Food brands like Chipotle Mexican Grill and Whole Foods Market have triggered consumer concerns about health, encouraging them to choose safe products and protect their health through advertising campaigns on organic food by raising questions about the risks of consuming unsafe food. In Vietnam, advertisements promote health protection and raise awareness of their products' impact on personal health by stimulating fear and anxiety, as seen in campaigns by Pharmacy and Vinamilk.

Numerous researchers have investigated consumer behavior across various fields, such as functional foods, sustainable consumption, and green consumption behavior, by applying the PMT. The research findings demonstrate that consumers are more likely to have high green purchasing or sustainable consumption intentions if they perceive the threat differently based on vulnerability, threat severity, and action effectiveness. Researchers have also combined various background theories to create different research models. For example, Zheng et al. (2020) studied green purchase behavior using the TPB and PMT. However, this study does not address the gap between consumer awareness, attitude, and behavior, which needs to be addressed since consumers express a willingness to buy sustainable products but then change their decisions when making a purchase (Jung et al., 2020). Several studies have mentioned the gap between consumers' attitudes and their intended actions or purchasing decisions (Carrington et al., 2014; Moraes et al., 2012; Shen et al., 2013). The attitude-to-behavior gap concept proposes that different individual elements, including demographics, lifestyle, and psychological factors (Carrington et al., 2014), may lead to inconsistencies between attitudes and behavior. According to Di Fabio & Rosen (2018), people may use opposite social moral norms to justify their inaction when attitudes and behavioral intentions are at odds. The gap between attitudes and behavior is influenced by personal and psychological factors that can either support or hinder sustainable behaviors. Then, adding social influence as a contextual factor may fill the attitude-to-purchase behavior gap.

Therefore, this study was conducted to understand green purchasing behavior by addressing the perception, attitude, and behavior gap and exploring the impact of social influence as a moderator. This research adds climate change worry, which is a new factor that has not been explored in any behavioral theories. Adding this factor will extend the PMT and explore the impact of PMT constructs on green consumption. The results show that social influence positively moderates the impact of threat appraisal and attitudes on green purchase behavior. Climate change worry indirectly influences behavior through threat appraisal. Based on these results, the authors would propose managerial and practical implications for green businesses to promote green consumers' purchase behavior.

2. Literature Review

2.1 Theories

2.1.1 TPB

The TPB was developed by Ajzen in 1991, based on some components of the theory of reasoned action (Fishbein & Ajzen, 1975). The TPB model improves upon the TRA model by adding an element of perceived behavioral control, making it more optimal for predicting and interpreting consumer behavior. Behavioral tendencies are influenced by three components: subjective norms, perceived behavioral control, and attitudes (Ajzen, 1991). The TPB theory has been applied to investigate consumer behavior in many research fields, such as Cachero-Martínez (2020), Qi & Ploeger (2021), and Dhir et al. (2021).

2.1.2 PMT

PMT theory, developed by Rogers (1975), explains the cognitive mediation of behavioral change through threat appraisal and coping appraisal; other research has expanded PMT theory to explain the impact of persuasive communication on behavior (Maddux & Rogers, 1983). This theory focuses on distinguishing between harmful and health-promoting behaviors and motivating individuals to adopt protective behaviors (Floyd et al., 2000; Prentice-Dunn & Rogers, 1986). PMT is structured around two cognitively mediated processes: threat and coping appraisal. By combining these two intermediary processes, individuals can develop a stronger motivation to adopt behaviors that protect their well-being. The PMT theory focuses on factors related to behavioral psychology, such as motivation, which are not mentioned in other theories. This theory is widely used in diverse research areas, including hotels and restaurants (Byrd et al., 2022) and health (Floyd et al., 2000; Taheri-Kharameh et al., 2020). Besides, there is also consumer behavior (Bockarjova & Steg, 2014; Chen, 2020; Ibrahim & Al-Ajlouni, 2018; Pang et al., 2021; Tan et al., 2022) and environmental behavior (van Zomeren et al., 2010). In the field of marketing management, most studies focus on behavioral intentions, but actual behavior studies are limited (Chen, 2020; Ibrahim & Al-Ajlouni, 2018; Kothe et al., 2019), because measuring perception is challenging.

2.1.3 ABC theory

The ABC theory, proposed by Guagnano et al. (1995), is a useful framework for understanding human behavior. This model suggests that contextual factors play a key role in determining green behavior, along with attitudes. Convenient conditions can strengthen the attitude toward behavioral relationships, while unfavorable conditions can weaken it. This means that even those who don't have strong environmental attitudes may take action to protect the environment in a favorable context, and people with positive environmental attitudes may be discouraged from taking action under certain limited conditions (Joshi & Rahman, 2015). The ABC theory is widely used in environmental protection behavior research such as climate change, green consumption, and waste recycling (Ertz et al., 2016; Goh & Balaji, 2016; Huang, 2016; Zhang et al., 2018).

2.1.4 Green product

Green products are defined as products that have little impact on the environment and are good for human consumption (Chen & Chai, 2010). Meanwhile, Schlegelmilch et al. (1996) classified green products into various categories, including products that do not harm the ozone layer, are not tested on animals, are recyclable, and are organically grown vegetables. Similarly, Biswas & Roy (2015) listed the characteristics of green products as follows: Energy saving, durable, and often low maintenance costs; beneficial to health; do not contain substances harmful to the ozone layer or cause environmental pollution; are easy to decompose or recycle.

2.2 Research Hypotheses

2.2.1 Threat appraisal and green purchase behavior

According to the PMT, threat perception influences purchase behavior by directly or indirectly impacting consumer attitudes (Tan & Lau, 2011). Ibrahim & Al-Ajlouni (2018) analyzed the threats that consumers face regarding the environmental impacts of conventional products. Chen (2020) found that threat appraisal drives intentions and behaviors to mitigate climate change and favor environmentally friendly products. Kothe et al. (2019) also argued that threat perception positively influences green consumption behavior.

Based on previous studies, the following research hypothesis is proposed:

H1: Threat appraisal directly and positively impacts green purchase behavior.

2.2.2 Attitude toward green products and green purchase behavior

The TPB theory of Ajzen (1991) asserts that attitude plays a crucial role in determining the intention to perform a behavior (Abdul-Muhmin, 2010), and it also significantly influences individual choices and behaviors (Kotler & Armstrong, 2021). Studies from Dhir et al. (2021) and Graessley et al. (2019) indicate that attitude is a prerequisite for green consumption intention. Similarly, Riskos et al. (2021) found that attitudes toward green product purchases positively influence green purchase behavior.

Based on previous studies, the following research hypothesis is proposed:

H2: Attitude toward green products directly and positively impacts green purchase behavior.

2.2.3 Threat appraisal and attitude toward green products

In the context of PMT, fear is often triggered by threats when consumers perceive that they are facing risk and are affected by it (Floyd et al., 2000). Consumers have positive attitudes toward environmental improvement policies and are concerned about environmental threats (Brécard et al., 2009). Besides, Maddux & Rogers (1983) suggest that threats motivate individuals to change their attitudes by taking measures to avoid them. Based on this assessment, environmental threats are considered a critical factor in determining climate change mitigation attitudes and attitudes toward green products (Baldassare & Katz, 1992; Chen, 2016).

Based on previous studies, the following research hypothesis is proposed:
H3: Threat appraisal directly and positively impacts attitudes toward green products.

2.2.4 Attitude toward green products and the impact of threat appraisal on green purchase behavior

According to Floyd et al. (2000), there is a positive impact of attitudes toward green products on green purchase behavior. Additionally, the study found that when consumers perceive a level of threat to the environment, they tend to increase green purchasing behavior to minimize negative environmental impacts and reduce the level of threat. Studies from Milne et al. (2000), Prentice-Dunn & Rogers (1986), Rogers (1975), Rogers (1983), and have shown that attitude and behavior change to mitigate the risk of health threats.

Based on previous studies, the following research hypothesis is proposed:
H4: Attitude toward green products mediates the impact of threat appraisal on green purchase behavior.

2.2.5 Climate change worry and threat appraisal

Verplanken & Roy (2013) argue that climate change anxiety is a positive factor in increasing threat appraisal. Kim et al. (2012) suggest that climate change worry can positively impact pro-environmental behavior by increasing threat appraisal. Climate change is becoming an increasingly important issue, and anxiety about the future of the environment and human life is also increasing (Albrecht, 2011; Berry et al., 2010; Fritze et al., 2008; Page & Howard, 2010; Reser & Swim, 2011).

Based on previous studies, the following research hypothesis is proposed:
H5: Climate change worry directly and positively impacts threat appraisal

2.2.6 Climate change worry and attitude toward green products

The higher the fear, the more the attitude changes (Rogers, 1975). According to Maddux & Rogers (1983), fear has been used to change attitudes and behavior on various topics, and fear is often effective in producing attitude change (Rogers, 1983; Shelton & Rogers, 1981). Research conducted by Lasuin & Ng (2014) in Malaysian universities has indicated that environmental concern plays a positive role in shaping green buying attitudes among students. Concern about the environment and attitudes have had a positive impact on consumers' purchases of green products, as demonstrated in the research of Paul et al. (2016) and Woo & Kim (2019). Furthermore, according to Riskos et al. (2021), attitudes toward green product purchases have a positive impact on green product purchase behavior. Hines et al. (1987) also found that there is a significant relationship between attitudes toward the environment and corresponding behavior.

Based on previous studies, the following research hypotheses are proposed:
H6: Climate change worry directly and positively impacts attitudes toward green products.
H10: Attitude toward green products mediates the impact of climate change worry on green purchase behavior.

2.2.7 Maladaptive rewards and threat appraisal

According to Rogers (1983), when the rewards for nonresponse are low, individuals tend to have a stronger motivation to protect themselves, leading to the development of protective behaviors. In addition, Al-Rasheed (2020) suggests that maladaptive rewards can have a significant and negative impact on threat appraisal. However, the extent of this impact may vary across cultures and different national circumstances (Zhang et al., 2023).

Based on previous studies, the following research hypothesis is proposed:
H7: Maladaptive rewards directly and positively impact threat appraisal.

2.2.8 Threat appraisal and the impact of climate change worry on green purchase behavior.

Fear has been employed to influence attitudes and behaviors in various areas of study (Higbee, 1969; Leventhal, 1970; Rogers, 1983). As fear appeal theories have progressed, researchers have recognized the crucial importance of cognitive mediational processes in persuasion (Maddux & Rogers, 1983). Rogers (1975) proposed the PMT to further elucidate communication's cognitive processes and susceptibility to external stimuli. According to Rogers (1975), fear appeal communication initiates cognitive evaluation processes that assess the severity of the impending event, along with two additional elements. These cognitive processes mediate the persuasive effects of fear appeals, stimulating protection motivation and motivating individuals to act to protect themselves from harm (Rogers, 1975). A recent study on protective motivation (Rogers, 1983) has emphasized the significance of three factors: the threat appraisal of the consequences, external influences on attitudes, and behavioral intention.

Based on previous studies, the following research hypothesis is proposed:
H8: Threat appraisal mediates the impact of climate change worry on green purchase behavior.

2.2.9 Moderating role: Social influence

Many consumers express a willingness to make sustainable purchases but often change their minds at the time of actual purchase (Jung et al., 2020). This has led to studies focusing on the gap between consumer attitudes and their intentions or actual buying behavior (Carrington et al., 2014; Moraes et al., 2012; Shen et al., 2013). Between

attitudes and behaviors, there are many factors affecting green purchasing, including social norms (Joshi & Rahman, 2015). According to TPB theory, subjective norms are one of the key factors in predicting behavior (Ajzen, 1991). In fact, subjective norms play a significant role in moderating the impact of attitude on purchase behavior, as well as between perceived behavioral control and purchase behavior (Al-Swidi et al., 2014; Harjadi & Gunardi, 2022).

The PMT suggests that attitudes and behavioral intentions can be influenced by two cognitive mediating processes, threat appraisal and coping appraisal (Cismaru & Lavack, 2006). According to Deliana & Rum (2019), there is a gap between consumer perception and behavior based on the ABC theory; and some researchers proved that (Ibrahim & Al-Ajlouni, 2018; Kollmuss & Agyeman, 2002). Social norms are the perceptions of an individual about how others behave or what they consider proper behavior. Since they are influenced by interpersonal interactions, social norms can moderate the relationship between one's thoughts and actions as a form of social influence (Chou & Sun, 2017). Thus, external factors such as social influence can affect the impact of threat appraisal on buying behavior, which aligns with the attitude-behavior context theory.

Based on previous studies, the following research hypotheses are proposed:

H9a: Social influence significantly moderates the impact of threat appraisal on green purchase behavior

H9b: Social influence significantly moderates the impact of attitude toward green products on green purchase behavior.

Based on the above research hypotheses, the author group proposes the research model as shown in Figure 1 below:
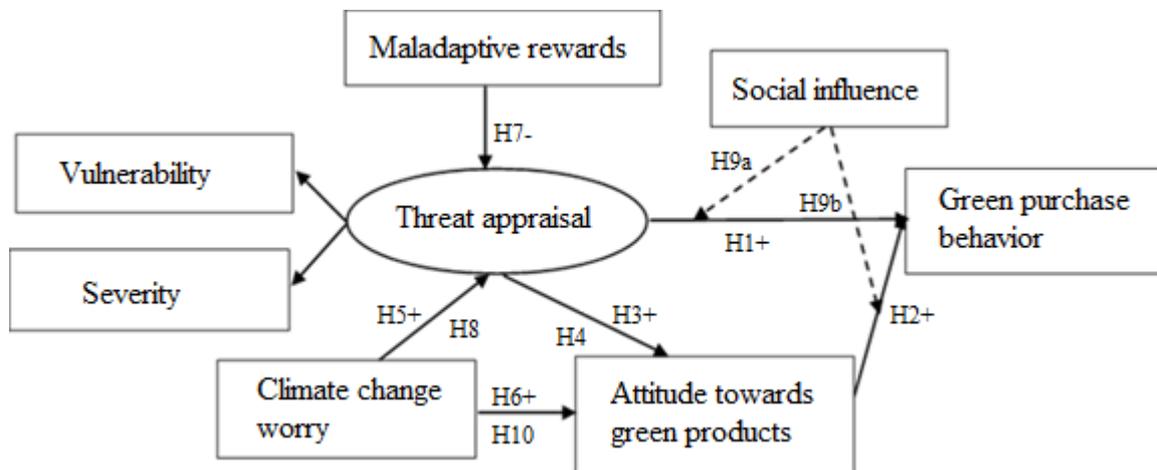

Figure 1. Research model

3. Methods

3.1 Research Procedure

The authors have applied both qualitative and quantitative research, as mentioned in Figure 2; the research procedure is shown in detail below:

Qualitative research: to establish the research objectives, the authors first engaged in discussions with 20 consumers in Vietnam who had previously purchased green products. Following these discussions, the authors conclude that a significant majority of consumers express a desire to mitigate climate change in their decision-making process concerning green products. This inclination is largely driven by a pervasive concern among consumers that climate change is exacerbating and becoming more severe. Subsequently, the authors conducted a comprehensive literature review to conceptualize the factors of the research model. The hypotheses were formulated and a research model was developed. Relevant studies were examined to construct an initial scale. In the next phase, the authors conducted in-depth interviews with one economics professor, two marketing lecturers, and ten customers to gather feedback and finalize the measurement scale. A preliminary survey was also conducted to test the reliability of the draft scale. The final measurement scale was subsequently determined after the preliminary survey.

Quantitative research: an official survey was conducted both online and offline, with a total of 550 participants (300 offline and 250 online). The collected data was filtered using Excel and SPSS software programs to eliminate 2 non-respondents and 20 invalid respondents. The final data sample consisted of 528 valid respondents. To analyze the final data, the authors utilized SmartPLS software to measure the structural equation modeling (SEM).
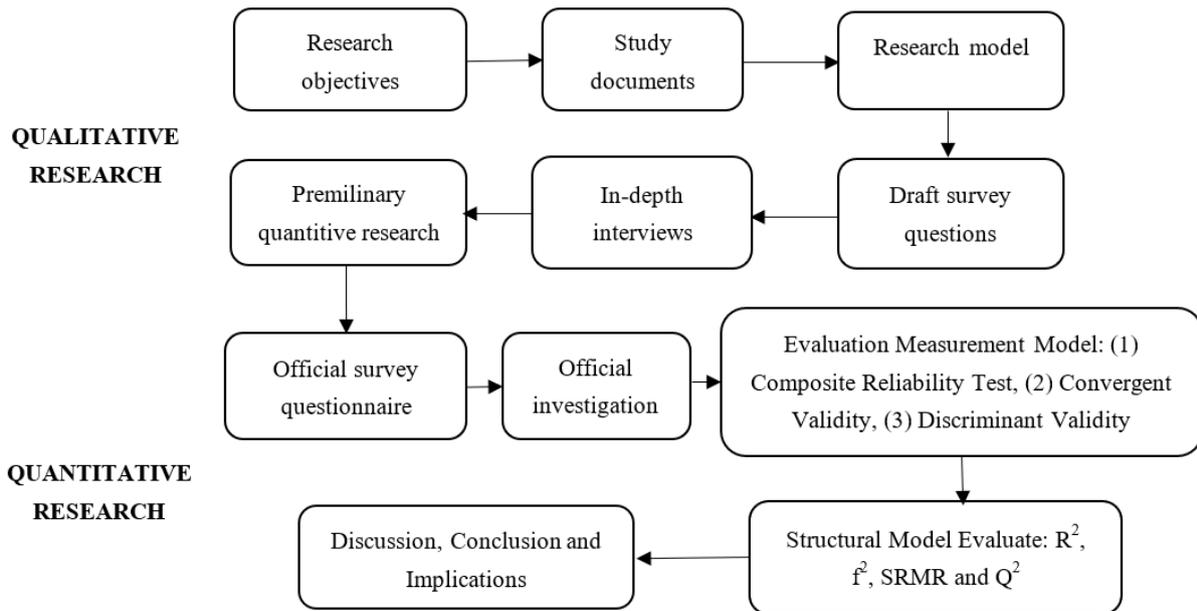
Figure 2. The research procedure

3.2 Measurement Scales

Several studies have used reliable scales to measure different variables. The measurement scales are adopted from reliable sources, and Cronbach's alpha is all over 0.7. The perceived vulnerability variable has been measured using 4 observed variables (Rainear & Christensen, 2017; Shafiei & Maleksaeidi, 2020), perceived severity variable has been measured using 6 observed variables (Rainear & Christensen, 2017; Zheng et al., 2020), maladaptive rewards variable has been measured using 5 observed variables (Chen, 2022; Ibrahim & Al-Ajlouni, 2018), climate change concerns have been measured using 10 observed variables (Stewart, 2021), attitude toward green products variable has been measured using 4 observed variables (Kamalanon et al., 2022), social influence has been measured using 4 observed variables (Chen et al., 2018), and green product purchasing behavior has been measured using 6 observed variables (Sajid et al., 2022). Please refer to Table 1 for more details.

Table 1. Measurement scales

Constructs	Items	Sources
Vulnerability	Environmental pollution can negatively affect you	Shafiei & Maleksaeidi (2020)
	You may be affected by negative impacts from environmental pollution in your lifetime	
	You are vulnerable to the negative effects of environmental pollution	
	Your chance of being negatively affected by environmental pollution is high	Rainear & Christensen (2017)
Severity	Environmental pollution is a serious issue	Rainear & Christensen (2017)
	Environmental pollution will cause negative consequences	
	The negative impact of environmental pollution is serious	
	Thinking about environmental pollution makes you scared	
	Environmental problems are threatening our health	Zheng et al. (2020)
	According to your opinions, environmental problems must be resolved urgently	
Maladaptive rewards	You think that it is easy to buy conventional products	Ibrahim & Al-Ajlouni (2018)
	You feel comfortable using common products	
	You will save time, effort, and money if you buy conventional products	
	It would be more interesting to keep your eating habits in a less environmentally friendly direction	
	You will be more satisfied if you keep your eating habits in a less environmentally friendly direction instead of the suggested measures	Chen (2022)
Climate change worry	You are more worried about climate change than others	
	Thoughts about climate change make you worry about what might happen in the future	Stewart (2021)
	You tend to search for information about climate change in the media (e.g., TV, newspapers, and the internet)	

	You tend to worry when you hear about climate change, even though the effects of climate change may be sometime away	
	You are concerned that severe weather may be a result of climate change	
	Worrying about climate change makes you feel paralyzed by being unable to do anything about it	
	You worry that you may not be able to cope with climate change	
	You realize that you are worried about climate change	
	Once you start worrying about climate change, you may find it difficult to stop	
	You are worried about the impact of climate change on the people you care about	
	You like the idea of buying green products	
Attitude toward green products	You have a positive attitude toward purchasing a green product	Kamalanon et al. (2022)
	Environmental protection is important to you when purchasing	
	Buying green products can help protect nature and save resources	
	You learn about green products from friends, family, and colleagues	
	If your friends buy green products, you will also buy green products	
Social influence	You will share information about buying green products with friends, family, and colleagues	Chen et al. (2018)
	Most of your friends and family buy green products	
	You often buy green products	
	You often buy products labeled as environmentally safe	
	You often buy products that contain no or few chemical ingredients	
Green purchase behavior	When considering purchasing a product, you will look for products that have an organic stamp or are certified to be environmentally safe	Sajid et al. (2022)
	You often buy products that support fair trade (ethical business, creating opportunities for disadvantaged people, etc.)	
	You often buy products that use recyclable packaging	

3.3 Data Collection and Sample

In this study, a convenient random sampling method will be used. Comrey & Lee (1992) classified sample sizes as follows: 100 = poor, 200 = fair, 300 = good, 500 = very good, and 1,000 or more = excellent. To ensure the appropriateness of using the SEM model, Tabachnick & Fidell (2007) also recommend a sample size of 300 to be good, and over 500 to be very good. In this study, the authors estimate a sample size of about 548 respondents, including 150 online and 398 in person. The survey subjects were consumers who reside in Vietnam.

3.4 Measurement Model Analysis

In this study, the authors explore green purchase behavior by integrating three behavioral theories. The proposed model includes mixed higher-order variables and moderating relationships. As this was an exploratory study that involved mixed higher-order variables, the authors utilized the partial least squares structural modeling technique to analyze the complex research model (Hair et al., 2022). To test hypotheses and explain the results of our proposed research model, the authors have employed the SmartPLS software.

4. Results

4.1 Descriptive Statistics

Table 2 displays data collected from a survey of 528 consumers. Out of the total surveyed, there were 347 female customers, accounting for 65.7% of the participants, while male customers were 180, accounting for 34.1%. In terms of age, the age group of 26-34 years old had the highest number of respondents, with 197 people (37.3%). The second-highest age group was 35 to 45, with 172 people (32.6%). The age group of 18 to 25 was the third-highest, with 104 survey respondents (19.7%). In terms of marital status, 231 people surveyed were unmarried, accounting for 43.8%, and the proportion of married people surveyed was 55.5% (293 people). Most of the surveyed customers had a university degree, with 179 surveyors (33.9%). Intermediate level was the second-highest, with 155 people (29.4%). In terms of income, 32.0% of the surveyed people had an income of 350 USD or under 600 USD, accounting for the highest percentage. 26.5% of them had an income of 600 USD—under 1,200 USD.

Table 2. Descriptive statistics (n=528)

Quantitative Variable	Observed Variables	Quantity	Ratio
Gender	Male	180	34.1%
	Female	347	65.7%
	Other	1	0.2%
Age	From 18 to 25	104	19.7%
	From 25 to 34	197	37.3%
	From 35 to 45	172	32.6%
	From 46 to 54	49	9.3%
	Over 55	6	31.1%
Marriage status	Married	293	55.5%
	Unmarried	231	43.8%
Qualification	Middle school, high school	92	17.4%
	Intermediate level	155	29.4%
	College	32	6.1%
	University	179	33.9%
	Postgraduate	70	13.3%
Income	From 150 USD to under 300 USD	124	23.5%
	From 300 USD to under 600 USD	169	32.0%
	From 600 USD to under 1,200 USD	140	26.5%
	Over 1,200 USD	95	18%

4.2 Measurement Model Results

4.2.1 Measurement of SEM of first-order variables

After removing the variables CCW9 and GBP4 from Table 3, the results of the second test showed that Cronbach's alpha (CA) and composite reliability (CR) were both greater than 0.708. This indicates that the reliability of the scale was acceptable. Furthermore, the external loading factor was also greater than 0.708, and the convergent value (AVE) was greater than 0.5. These results meet the requirements outlined by Hair et al. (2022). Additionally, all first-order variables met the criteria for higher-order variable testing. In Table 4, all the HTMT values are under 0.85, meaning that all the observed variables achieve discriminant validity (Hair et al., 2022).

4.2.2 Measurement of SEM of higher order variables

In Table 5, the indicator loadings, average variance extracted (AVE), CR (rho_c), and Cronbach's alpha coefficient all fulfilled the established criteria (Hair et al., 2022). Moreover, in Table 6, all the HTMT values of the variables involved in the research were below 0.85, suggesting that the scales of these variables demonstrated discriminant validity (Henseler et al., 2015). In Table 7, the model fit is 0.073 (< 0.08), and the NFI is 0.08, meaning that the model achieves good fit (Hair et al., 2022).

Table 3. Measurement model: Loadings, construct reliability and convergent validity

Scale	Loading	CA	CR (rho_c)	AVE	VIFs	Scale	Loading	CA	CR (rho_c)	AVE	VIFs
GPB		0.903	0.928	0.721		**MR**		0.903	0.928	0.720	
GPB1	0.873				2.704	MR1	0.831				2.402
GPB2	0.854				2.345	MR2	0.879				2.977
GPB3	0.771				1.837	MR3	0.891				3.328
GPB5	0.843				2.382	MR4	0.816				2.012
GPB6	0.898				3.220	MR5	0.822				2.133
CCW		0.947	0.955	0.702		**SI**		0.909	0.932	0.775	
CCW1	0.842				3.315	SI1	0.943				4.240
CCW2	0.779				2.413	SI2	0.926				3.517
CCW3	0.833				2.782	SI3	0.804				2.673
CCW4	0.833				2.799	SI4	0.841				2.854
CCW5	**0.859**				**3.361**	**AGP**		0.903	0.932	0.775	
CCW6	0.864				2.879	AGP1	0.887				2.937
CCW7	0.889				4.265	AGP2	0.904				3.184
CCW8	0.827				2.921	AGP3	0.851				2.330
CCW10	0.810				2.490	AGP4	0.879				2.579
SE		0.900	0.923	0.668		**VUL**		0.845	0.896	0.683	
SE1	0.764				2.047	VUL1	0.858				2.293
SE2	0.789				2.209	VUL2	0.867				2.266
SE3	0.795				2.120	VUL3	0.808				1.763
SE4	0.874				3.129	VUL4	0.769				1.571
SE5	0.832				2.633						
SE6	0.845				2.614						

Table 4. Measurement model: Discriminant validity

	AGP	CCW	GPB	MR	SE	SI	VUL	SI x AGP
AGP								
CCW	0.224							
GPB	0.679	0.327						
MR	0.574	0.293	0.720					
SE	0.562	0.266	0.729	0.622				
SI	0.434	0.065	0.454	0.374	0.348			
VUL	0.198	0.297	0.461	0.389	0.629	0.327		
SI × AGP	0.073	0.346	0.368	0.299	0.259	0.296	0.230	

Table 5. Measurement model: Loadings, construct reliability and convergent validity

Scale	Loading	CA	CR (rho_c)	AVE	Scale	Loading	CA	CR (rho_c)	AVE
TA		**0.709**	**0.865**	**0.763**	**MR**		**0.903**	**0.928**	**0.720**
LV scores - SE	0.940				MR1	0.831			
LV scores - VUL	0.802				MR2	0.879			
GPB		**0.903**	**0.928**	**0.721**	MR3	0.891			
GPB1	0.873				MR4	0.817			
GPB2	0.854				MR5	0.822			
GPB3	0.772				**SI**		**0.909**	**0.932**	**0.775**
GPB5	0.843				SI1	0.943			
GPB6	0.898				SI2	0.926			
CCW		**0.947**	**0.955**	**0.702**	SI3	0.804			
CCW1	0.842				SI4	0.841			
CCW2	0.780				**AGP**		**0.903**	**0.932**	**0.775**
CCW3	0.833				AGP1	0.887			
CCW4	0.833				AGP2	0.904			
CCW5	0.859				AGP3	0.851			
CCW6	0.864				AGP4	0.879			
CCW7	0.889								
CCW8	0.827								
CCW10	0.810								

Table 6. Measurement model: Discriminant validity

	AGP	CCW	GPB	MR	SI	TA	SI × AGP	SI × TA
AGP								
CCW	0.224							
GPB	0.679	0.327						
MR	0.574	0.293	0.720					
SI	0.434	0.065	0.454	0.374				
TA	0.481	0.353	0.755	0.640	0.426			
SI × AGP	0.073	0.346	0.368	0.299	0.296	0.309		
SI × TA	0.265	0.252	0.403	0.342	0.180	0.318	0.478	

Table 7. Model fit

	Saturated Model	Estimated Model
SRMR	0.073	0.106
NFI	0.800	0.789

4.3 Structural Model Results

The results of bootstrapping, conducted with a sample size of 10,000, indicate that there is no issue of multicollinearity as all VIF scores are below 3.0. According to Hair et al. (2022), all the P-values of the relationships are below 0.05, indicating that all relationships are supported. However, no support is found for H10 because attitudes are not related to the impact of climate change worry on green purchase behavior (b = 0.029, P > 0.05). The adjusted R^2 of AGP is 0.194, meaning that CCW and TA variables explain 19.4% of the variance in AGP. The adjusted R2 of TA is 0.320, indicating that MR and CCW variables account for 32.0% of TA's variance. The adjusted R^2 of GPB is 0.660, implying that TA and AGP variables explain 66.0% of the variance in GPB.

Table 8. Hypotheses testing results

Hypothesis	Relationship	β	Path Coefficient	STDEV	T Statistic	Confidence Intervals	P-value	VIF	Conclusion
Direct effect									
H1	TA → GPB	0.283	0.282	0.029	9.753	[0.338-0.470]	0.000	1.519	Supported
H2	AGP → GPB	0.299	0.299	0.034	8.862	[0.233-0.367]	0.000	1.495	Supported
H3	TA → AGP	0.403	0.405	0.034	11.899	[0.338-0.472]	0.000	1.103	Supported
H4	CCW → TA	0.161	0.163	0.034	4.775	[0.097-0.228]	0.000	1.091	Supported
H5	CCW → AGP	0.099	0.100	0.046	2.159	[0.081-0.250]	0.031	1.103	Supported
H7	MR → TA	-0.500	-0.500	0.025	19.752	[-0.548 - (-0.450)]	0.000	1.091	Supported
Indirect effect									
H4	TA → AGP → GPB	0.121	0.121	0.018	6.810	[0.088-0.159]	0.000		Supported (Full mediation)
H8	CCW → TA → GPB	0.046	0.046	0.011	4.199	[0.026-0.068]	0.000		Supported (Partial mediation)
H10	CCW → AGP → GPB	0.029	0.030	0.015	1.912	[0.003-0.063]	0.056		No Supported
Moderator effect									
H9a	SI x TA → GPB	0.185	0.185	0.041	4.558	[0.107-0.266]	0.000	1.454	Supported
H9b	SI x AGP → GPB	0.353	0.355	0.040	8.880	[0.282-0.436]	0.000	1.478	Supported

R^2 adjusted
R^2 AGP = 0.194
R^2 TA = 0.320
R^2 GPB = 0.660
f^2
f^2 MR → TA = 0.337
f^2 CCW → TA = 0.035
f^2 AGP → GPB = 0.178
f^2 TA → GPB = 0.156
f^2 TA → AGP = 0.184
f^2 CCW → AGP = 0.011
f^2 SI × AGP → GPB = 0.147
f^2 SI × TA → GPB = 0.044

Results from Table 8 indicate that the standardized beta coefficients of direct relationships, such as TA => AGP is 0.403, AGP => GPB is 0.299, TA => GPB is 0.283, CCW => TA is 0.161, CCW => AGP is 0.099, and MR => TA is -0.500. These results suggest that attitude toward green products (AGP) and perceived environmental threat (TA) have positive and direct impacts on green product buying behavior (GPB). In other words, as attitudes and perceived threats increase, the tendency to purchase green products also increases. On the other hand, threat appraisal (TA) has a positive and direct impact on attitude toward green products (AGP), meaning that the higher the threat appraisal, the more positive consumers' attitude toward green products is. In addition, climate change worry (CCW) has a positive and direct impact on threat appraisal (TA) and attitude (AGP), which shows that the higher the worry, the higher the threat appraisal and consumer attitude. In contrast, maladaptive rewards (MR) have a negative impact and directly affect the threat appraisal (TA), so the more benefits consumers see in buying conventional products, the more they will underestimate the threat. Therefore, hypotheses H1, H2, H3, H5, H6, and H7 are supported. The results also show that the standardized beta coefficients of mediating relationships between TA => AGP => GPB is 0.121 and CCW => TA => GPB is 0.046. Therefore, hypotheses H4 and H8 are supported, which means that attitude and threat appraisal play a mediating role in the above-mentioned relationships.

Based on the criterion f^2 by Cohen (1988), the findings suggest that MR has a medium impact on TA, while the impact of CCW is relatively weak (f^2 MR => TA = 0.337; f^2 CCW => TA = 0.035). The two variables AGB and TA have a medium impact on GPB (f^2 AGB => GPB = 0.178; f^2 TA => GPB = 0.156). TA has a medium impact

on AGP (f^2 TA => AGP = 0.184), whereas the impact of CCW is extremely weak (f^2 CCW => AGP = 0.011). In addition, the moderating role of SI has a weak impact on the influence of AGP - GPB and TA - GPB (f^2 SI x AGP => GPB = 0.147; f^2 SI x TA => GPB = 0.044).

In summary, the PLS-SEM model results have six direct effects, two indirect effects, and two moderating effects.

4.4 Moderating Effect of Social Influence

As mentioned, this study aimed to examine the moderating effect of SI between AGP - PI and CA - PI. The three factors AGP, CA, and SI were initially assigned standardized values. In addition, the value of the moderator was calculated, indicating that the structural model was validated. According to Table 8, Figure 3, and Figure 4, Hypotheses H9a and H9b demonstrated that SI significantly changed the impact of CA on PI (b = 0.185) and AGP and PI (b = 0.353). This means that the higher the social influence, the greater the influence of AGP => GPB, TA => AGP.
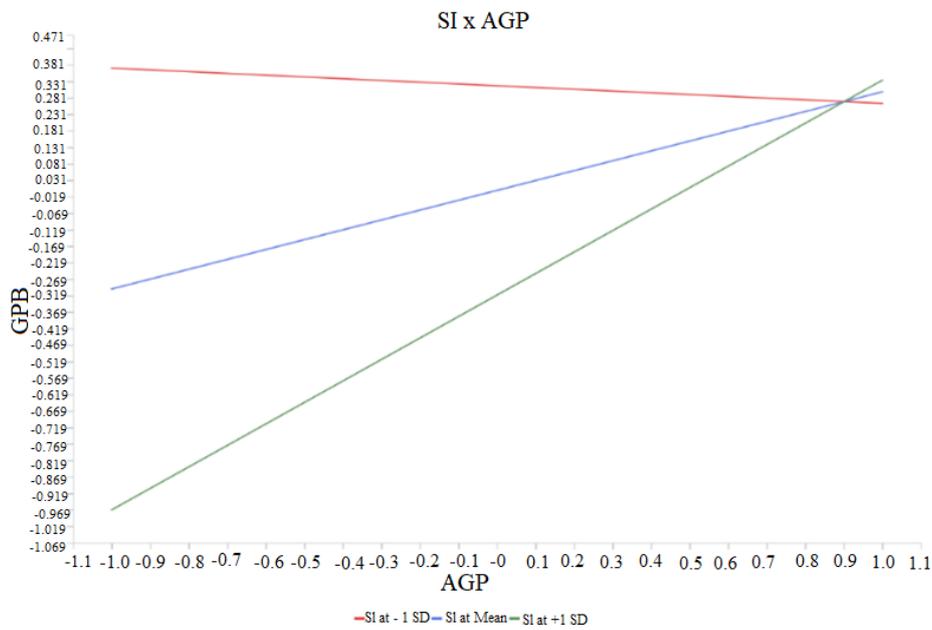
**Figure 3.** SI moderates AGP to PI
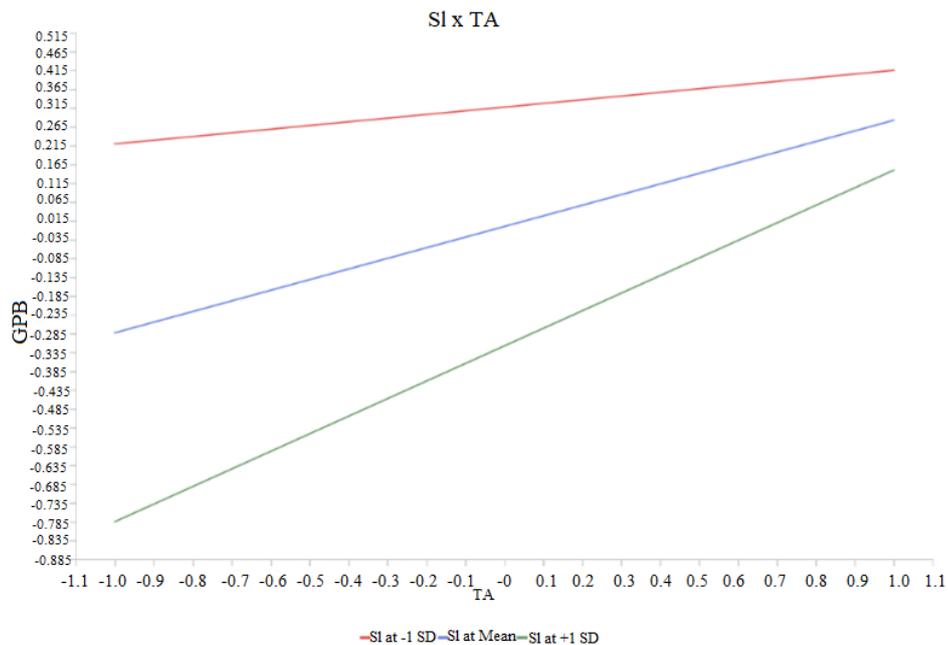
Figure 4. SI moderates TA to PI

44

4.5 Prediction of the Model

In Table 9, the results show that Q²predict of AGP, TA, GPB are all greater than 0, meaning the model's prediction is relevant.

Table 9. Prediction of the model

	Q²predict
AGP1	0.157
AGP2	0.161
AGP3	0.111
AGP4	0.158
GPB1	0.404
GPB2	0.387
GPB3	0.263
GPB5	0.327
GPB6	0.363
LV scores - SE	0.324
LV scores - VUL	0.138

4.6 Discussion

The findings presented in Table 8 support H1, suggesting that threat appraisal positively influences green purchase behavior (b = 0.283). The study underscores the importance of consumers evaluating the level of environmental threat when developing behaviors related to purchasing green products. These results are consistent with the research conducted by Chen (2020), who posits that awareness of environmental threats promotes the intention to buy environmentally friendly products. Furthermore, the outcomes align with studies carried out by Ibrahim & Al-Ajlouni (2018) and Kothe et al. (2019), indicating that threat appraisal, a fundamental component of PMT, leads to behaviors that mitigate environmental threats, such as the purchase of environmentally friendly products. In contrast, according to Pang et al. (2021), only coping appraisal positively affects the purchase of green products, while threat appraisal does not. The results suggest that the effects of threat appraisal on green purchase behavior may not be universally applicable or validated across different research models. This discrepancy could be attributed to the mediating effect of subjective perspectives and attitudes toward adopting eco-friendly behavior.

The study also supported H2, indicating that attitudes positively and directly impact green purchase behavior (b = 0.299). The results imply that consumers' attitudes significantly influence their decision to purchase green products. This finding aligns with the arguments presented in studies by Dhir et al. (2021), Graessley et al. (2019) and Riskos et al. (2021), highlighting how a positive attitude toward a specific behavior leads to the intention to perform that behavior, which is consistent with the TPB theory.

Furthermore, the study supports H3, indicating that threat appraisal positively and directly impacts attitudes toward green products (b = 0.403). The results suggest that consumers tend to have a more favorable attitude toward green products when they perceive a high environmental threat. This finding aligns with the research conducted by Brécard et al. (2009), Chen (2016) and Maddux & Rogers (1983), which propose that PMT structures can influence attitudes and behaviors. H5 is supported, indicating that climate change worry positively and directly influences threat appraisal (b = 0.161). This finding suggests that climate change worry can result in perceiving environmental threats, similar to the studies conducted by Kim et al. (2012) and Verplanken & Roy (2013), where consumers experienced anxiety about a problem, evaluated the level of threat associated with it, and implemented protective measures based on the PMT's framework.

Similarly, H6 is supported, indicating that climate change worries positively and directly influence attitudes toward green products (b = 0.099). The results align with the studies conducted by Lasuin & Ng (2014), Paul et al. (2016) and Woo & Kim (2019), which concluded that worry and concern for the environment have a positive impact on consumers' green behavior. This finding is consistent with the PMT theory proposed by Rogers (1975).

Furthermore, Hypothesis H7 is substantiated, demonstrating that maladaptive rewards have a detrimental and direct effect on threat appraisal (b = -0.500). The study by Rogers (1983) also supports this observation, suggesting that rewards are inversely related to threat appraisal, meaning that higher rewards for non-adaptive responses result in less adaptive behavior by individuals. Al-Rasheed (2020) and Zhang et al. (2023) conducted similar studies on the effects of maladaptive rewards on threat appraisal. However, Zhang et al. (2023) indicated that rewards have a minor and negative influence on threat appraisal. This discrepancy is attributed to national and cultural factors, as individuals in China may need to be more aware of the rewards associated with not implementing protective measures.

Additionally, the results confirm Hypothesis H4, indicating that attitude toward green products mediates the impact of threat appraisal on green purchase behavior (b = 0.121). Moreover, Hypothesis H8 is supported,

demonstrating that threat appraisal mediates the effects of climate change worry on green purchase behavior (b = 0.046). However, Hypothesis H10 is not supported, indicating that attitude toward green products does not mediate the impact of climate change worry on green purchase behavior. This finding aligns with the PMT theory, which suggests that fear does not directly influence attitude and behavior change but only indirectly through threat appraisal (Rogers, 1983). By adding climate change worry as a new factor, we extend the PMT theory and gain a greater understanding of consumer behavior. H9a is supported by b = 0.185, signifying that social influence significantly influences the effects of threat appraisal on green purchase behavior. This finding aligns with the ABC theory when social influence is the contextual factor, which may influence the relationship between perception and behavior.

However, Jain (2020) presents a contrasting conclusion regarding the moderating role of social norms in the relationship between attitudes and the intention to purchase. The study by Jain (2020) focuses on luxury items and reveals a negative and significant moderating effect of social norms. This discrepancy suggests that Indian Generation Y consumers are increasingly individualistic in their shopping habits and may make purchases that deviate from popular choices.

Moreover, H9b is also supported, with b = 0.353, indicating that social influence moderates the relationship between attitudes and green purchase behavior. This result is consistent with the findings of Al-Swidi et al. (2014), Chou & Sun (2017), Harjadi & Gunardi (2022) and Jain (2020), who argue that social norms can serve as moderators between attitude and behavior rather than serving as a mere premise.

5. Conclusion and Managerial Implications

5.1 Conclusions

According to the research model, the authors measured the relationship between customers' green purchase behavior and several factors, including climate change worry, attitude toward green products, threat appraisal, and green purchase behavior. The results also show the mediating role of attitude toward green products and the moderating role of social influence. The results show that attitude toward green products has the strongest influence on green purchase behavior (b = 0.299), followed by threat appraisal (b = 0.283). Maladaptive rewards negatively influence threat appraisal (b = -0.500). Attitude toward green products mediates the impact of threat appraisal on green purchase behavior (b = 0.121). Threat appraisal mediates the impact of climate change worry on green purchase behavior (b = 0.046). Furthermore, social influence was found to moderate the impact of threat appraisal (b = 0.185) and attitude toward green products (b = 0.353) on green purchase behavior.

The purpose of this study is to investigate and promote green product purchasing behavior more academically. The findings of this study can assist managers in developing marketing strategies that enhance consumer awareness about the detrimental impact of unsustainable consumption on both their well-being and the environment. The study also examines how the influence of threat appraisal and attitude on green purchase behavior varies under different contextual factors, such as social influence. By incorporating social influence as a contextual factor, the gaps between attitude and behavior have been addressed. Additionally, adding the factor of climate change worry is new, with no studies exploring the impact of this factor in any behavioral theories. Therefore, this study aims to expand upon the PMT and gain a better understanding of consumers' green purchase behavior by integrating three behavioral theories. The results contribute to the comprehension of the relationships that shape consumers' green buying behavior. Future studies could further apply the PMT to explore green consumption.

5.2 Managerial Implications

Based on the above research results, the authors propose several managerial implications for promoting green purchase behavior. First, focus on the marketing campaign, including traditional and modern advertising, emphasizing the strengthening of environmental awareness and the consequences of unsustainable consumer behavior to arouse the consumer threat appraisal process and introduce the benefits of green products. Incorporate positive experiences such as environmental cleanup and tree planting to promote awareness of the use of green products and their positive impact on the environment. Use social influence through marketing campaigns and community participation to spread the message of green products and the importance of green consumption to the environment and human health.

According to a study conducted in Ho Chi Minh City, consumers have a high tendency to purchase green products, with an average coefficient of 4.1424 (above the median of 3) because of their high attitude toward green products (above the median of 3). Additionally, the social impact is high, with an average coefficient of 3.16 higher than the median. This leads to an increase in the impact of threat appraisal and attitudes on consumers' green purchase behavior. Moreover, maladaptive rewards are low, with an average coefficient of 2.75 (below the median of 3). This will increase the threat appraisal process, resulting in high green purchase behavior. To capitalize on this trend, businesses selling green products can continue to reduce the rewards of buying conventional products

or the inconveniences of buying green products for consumers. They can do this by proposing to the Vietnamese government to reduce taxes, thereby cutting production costs, adjusting product prices lower to match consumers' income, implementing promotions for retail stores and supermarkets so that products are sold more and at beautiful locations of the store, helping consumers easily access green products, and using promotions to attract and stimulate their shopping needs. In addition, to increase social influence on consumers, businesses can cooperate with celebrities and experts in the field of the environment in the social activities proposed by the authors above. This will help the campaign message reach more target customers more effectively. They can also choose appropriate social networking platforms, such as TikTok and Facebook, to enhance the promotion of necessary information to the public.

5.3 Limitations

The conclusions presented in the previous section have certain limitations and offer potential avenues for future research to improve consumers' green purchasing behavior. Firstly, using a cross-sectional study design, the current research predominantly examines consumers' behavior in purchasing green products. In the future, researchers could employ longitudinal research methods to gain a more comprehensive understanding of this issue. Secondly, the study was conducted over a short period and focused solely on Vietnam, which limits the generalizability of the results to consumers' green purchasing behavior nationwide. Thirdly, the present study solely concentrates on one contextual factor: social influence. Future research could explore additional contextual factors such as skepticism, trust, awareness, or peer influence to gain deeper insights into consumers' green purchasing behavior and expand the research model, such as the TPB or PMT theories. Lastly, other emotional states, such as hope or happiness, could be included and integrated into the PMT rather than solely focusing on fear.

Author Contributions

Conceptualization, Nguyen Le and Hoa Lien Thi Nguyen; methodology, Lam Hoang Pham and Tuyet Hong Chau; software, Nguyen Le; validation, Nguyen Le and Hoa Lien Thi Nguyen; formal analysis, Lam Hoang Pham and Tuyet Hong Chau; investigation, Lam Hoang Pham and Tuyet Hong Chau; resources, Hoa Lien Thi Nguyen; data curation, Nguyen Le; writing—original draft preparation, Lam Hoang Pham and Tuyet Hong Chau; writing— review and editing, Nguyen Le; visualization, Nguyen Le; supervision, Nguyen Le; project administration, Nguyen Le; funding acquisition, Hoa Lien Thi Nguyen. All authors have read and agreed to the published version of the manuscript.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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