



Mindful Consumption: Investigating the Role of Environmental Risk Perception and Green Advertising on Thai Consumers' Green Purchasing Intentions

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Abstract

This study investigated the role of environmental perceptions and cognitions and green advertising on the purchase intentions of Thai consumers, using the stimulus-organism-response approach. Green risk perception (the perceived risk of environmental damage and climate change) and green advertising were positioned as stimuli, with environmental concern (awareness of and concern for environmental issues) and green attitude (willingness to act on environmental concern) as organism processes and purchase intention for green goods as response. Data was collected using an online survey of Thai consumers ($n = 450$) and analyzed using descriptive statistics and ordinary least squares regression. Results showed significant positive effects of environmental risk perception and green advertising on environmental concern and green attitude. Environmental concern and green attitude had significant positive effect on purchase intention for green goods. The research addressed a gap in understanding of external stimuli like environmental risk perception and green advertising on consumer cognitions and behavior. The study's findings suggest these external stimuli may be more important than previously thought in influencing purchase intentions, which has implications for both theory and for marketing practice.

Keywords

Environmental Risk Perception, Green Advertising, Green Attitude, Green Marketing, Stimulus-organism-response (S-O-R)

Research background

Environmental concern is rising sharply, driven by the increasing pressures of climate change and growing awareness of the importance of the environment and the impact of pollution and environmental damage on the planet and the livelihoods of people (Oludoye et al., 2024). Digital media and communication technologies have led to increased awareness of and concern about the impact of climate change and human impacts on the environment among people around the world (Udalov & Welfens, 2021). In industrializing countries, environmental concern may be particularly high due to pollution and other ecological impacts of industrialization processes (Usman et al., 2022). Thailand has followed a typical path of increasing awareness of the environment and environmental concern in response to growing pollution and environmental impacts. In 2021, Thailand's energy sector produced 269 million metric tons of carbon emissions (Ou, 2025). The Thai government is implementing policies to reduce greenhouse gas emissions by investing in renewable energy, promoting efficiency, and improving public transport. Thai consumers are also increasingly seeking sustainable products and services (Ou, 2025). Thus, the market for environmentally friendly (green) goods and services, while still small, is a growing segment of the Thai economy (Ou, 2025).

The growing awareness of and concern for the environment raises the question of how consumers respond to green advertising in light of these changing attitudes. For example, some consumers have a general concern for the planet, but their actions may be inconsistent; they might recycle but not actively seek out information on the environmental impact of consumer industries (Bala et al., 2023). According to prior research, consumer responses to green advertising vary between cultures. Responses to green advertising are known to vary depending on culture, as shown in a study that compared US and Thai consumers. This study found that consumers had different preference rankings for green advertising appeals; American consumers preferred imaginative, eye-catching, informative, and interesting appeals most, while Thai consumers preferred meaningful, interesting, natural, and informative appeals (Ruanguattamanun, 2023). Furthermore, the domestic environment—not only the global environment—plays a role in the formation of environmental concern and perceptions of environmental responsibility (Janmaimool & Chudech, 2020). Additionally, there are differences in specific environmental problems that may influence the consumer, for example, the visibility of plastic waste pollution in different areas (Oludoye et al., 2024). This issue makes it difficult to generalize a single response to environmental pollution.

Environmental issues like climate change, air and ground pollution, and the impact of single-use plastics have become pressing concerns for Thai people, and these issues have driven changes in attitudes and consumption practices in recent years (Janmaimool & Chudech, 2020; Oludoye et al., 2024). In concert with this growing environmental concern and awareness of environmental impacts has been a rise in the use of green advertising, in which products and services are promoted not just for their own characteristics, but also for their environmental credentials and impacts (Fowler & Close, 2012). While Thailand still lags behind major markets, including the United States and Europe, in the use of green advertising, there has been significant growth in the practice in recent years, alongside other green marketing practices such as the use of eco-labels (Nguyen-Viet, 2022; Ruanguttamanun, 2023). This suggests that there is an increasing orientation within Thai society toward environmental consciousness and conscious consumption. However, it is not clear how these phenomena are related through consumer action. The relationships between external factors like green advertising and environmental risk perception are not well studied, with few studies making direct links between these constructs.

The purpose of this study is to investigate the role of environmental risk perception and green advertising in purchase intentions among consumers using the stimulus-organism-response (S-O-R) approach. Within this framework, environmental risk perception and green advertising are proposed as external stimuli, with “environmental concern” and “green attitudes” proposed as internal (organism) processes by which the stimuli are evaluated, and purchase intention as the behavior resulting from these internal processes.

1. Literature Review

1.1 Key Definitions

The study is based on several related cognitive and behavioral constructs. These constructs do have some overlap with other green constructs, due to the densely theorized space of green cognition, which contains several closely related models of thought, emotion, and action relating to the environment (Henry & Dietz, 2012). Brief working definitions of key constructs are provided in Table 1. More complex definitions are provided later in the literature review.

Table 1 Summary of key definitions

Construct	Definition
Environmental Risk Perception	The perceived likelihood and extent of harm associated with climate change, pollution, and other environmental damage (Maartensson & Loi, 2022).
Green Advertising	Advertising communication which directly addresses environmental issues and presents solutions, including consumer behaviors, to mitigate and/or correct environmental issues (Fowler & Close, 2012).
Environmental Concern	An individual's attitude toward the environment and cognitions surrounding environmental harm (De Canio, Martinelli, & Endrighi, 2021).
Green Attitude	Pro-environmental attitudes, encompassing individual awareness of and willingness to solve environmental problems (Shen, Rasdi, Ezani, & San, 2024; Van Huy, Nguyen, Hoang Long, Quyen Phu Thi, & Tan Nhat, 2023).
Purchase Intention	The consumer's explicit desire to, preference for, or plan to make a particular purchase (Stephens, 2017).
Greenwashing	Insincere use of environmental motivations, benefits, or credentials in advertising, for example use of meaningless eco-labels, claimed environmental benefits, or use of vague terms like 'natural' or 'chemical-free' (de Freitas Netto, Sobral, Ribeiro, & Soares, 2020).

Source: Authors

1.2 The Stimulus-Organism-Response (S-O-R) approach

This research was based on the stimulus-organism-response (S-O-R) approach to human cognition and decision-making. The S-O-R model argues that individual responses result from a combination of biological and psychological processing, which begins with the receipt and processing of an external stimulus (Buxbaum, 2016). The stimulus is an external factor that the organism perceives, which creates an arousal response within the organism, such as pleasure, fear, or curiosity (Buxbaum, 2016). Upon perception of the external stimulus and subsequent arousal, the organism undergoes a series of unobservable internal processes, including neurological, physiological, and cognitive processes, which ultimately lead to an observable response (Buxbaum, 2016). This response could be an observable behavior, but it could also be a stated intention (cognitive response) or emotion (affective response) (Mehrabian & Russell, 1974).

The S-O-R approach stems from environmental psychology. It was proposed as an improvement to the stimulus-response (S-R) approach, which argued that organism behavior resulted from the application of external stimuli but did not consider the 'black box' mechanisms of action that created the response (Mehrabian & Russell, 1974). Rather than stimuli creating responses directly, the S-O-R approach argued that there are intervening processes (the aforementioned neurological and cognitive responses) which affect how the organism behaves in response to the stimulus (Mehrabian & Russell, 1974).

The S-O-R approach does not always predict consumer responses, especially in settings that are not emotionally loaded (or, in other words, low-arousal and low-involvement situations) (Vieira, 2013). However, there is strong evidence in different contexts that when there is a high level of emotional arousal (especially fear and pleasure arousal), the S-O-R approach does predict behavioral responses (Blanco-Encomienda & Rosillo-Díaz, 2025; Jiang, Gao, & Su, 2022).

As this research focuses on a topic expected to cause strong arousal, it was therefore suitable as the theoretical basis. There are six hypotheses investigated in the conceptual framework (Figure 1), which associate two stimuli (environmental risk perception and green advertising), two organism processes (environmental concern and green attitudes), and one response (buying intention).

1.3 Environmental risk perception and environmental concern

The first stimulus-organism relationship investigated in this study is between environmental risk perception and environmental concern. Perceived risk, defined as "beliefs of the uncertainty regarding possible negative consequences (dangers) (Thakur & Srivastava, 2015, p. 151)," is an inherent factor in consumer decision-making, which is a continual process of taking and/or avoiding risks. Environmental risk perception relates specifically to the perceived risk of climate change and environmental damage (Maartensson & Loi, 2022). Environmental concern is "the consumer's general attitude toward preserving the environment (De Canio et al., 2021, p. 1316)." Environmental concern is grounded in knowledge about the environment (environmental awareness) and can be considered as both a cognitive and an emotional response to this knowledge (Cruz & Manata, 2020). The difference between environmental risk perception and environmental concern can be defined through the S-O-R model. Environmental risk perception refers to what the individual sees in the external environment and the extent and likelihood of possible harm from environmental damage (Thakur & Srivastava, 2015), while environmental concern refers to how the individual processes and responds to that perception cognitively and emotionally (De Canio et al., 2021). De Canio et al. (2021) showed that environmental concern is a significant internal organism process that does influence consumer decisions, making it a key response in this study.

There is also evidence from other research contexts that the perceived risk of environmental damage affects environmental concern. A study conducted among European consumers in the context of sustainable consumption practices found that environmental risk perception had a direct influence on environmental concern, which was actually stronger than the second predictor, environmental knowledge (Saari et al., 2021). Another recent study on sustainable consumption was conducted among Chinese university students (Zeng et al., 2023). These authors also found that environmental risk perception had a significant positive influence on environmental concern among participants, although in this case, the effect of environmental knowledge was stronger than that of perceived environmental risk. A second study, also in China, investigated multiple potential paths of the relationship between perceived environmental risk and environmental behavior (Gao et al., 2019). This study found that environmental risk perception had several direct influences, including on the public's perception of environmental governance and on environmental values, which are related to environmental concern. It should be noted that environmental cognitions are often tangled together, and (Henry & Dietz, 2012), and a bidirectional relationship between environmental risk perception and environmental concern is also possible. However, this relationship has less support empirically, so is not explored in this study. Overall, the evidence supports a direct influence of risk perception on environmental concern in sustainable consumption contexts. Therefore, the first hypothesis is stated as:

Hypothesis 1: Environmental risk perception positively influences environmental concern.

1.4 Environmental risk perception and green attitude

The second relationship investigated is between environmental risk perception and "green attitude." Green attitude can be defined as "the extent to which people are aware of environmental problems and their willingness to solve these problems (Van Huy et al., 2023, p. 14)." Green attitudes are also called pro-environmental attitudes by many authors (e.g., Ribeiro et al., 2025; Shen et al., 2024; Zaiem, Sobaih et al., 2025). Green attitudes are based on environmental knowledge (or environmental awareness) and environmental sensitivity but are more than simple knowledge; they also represent what an individual believes about the environment and what their responsibility is toward it (Bala et al., 2023).

Green attitudes are individual, but they are also influenced by broader cultural norms surrounding the environment, climate change, and the individual's role and responsibility for it (Larson & Kinsey, 2019). Therefore, findings from one culture cannot be directly applied to other cultural contexts. However, prior studies do provide some useful guidance about the relationship between risk perception and green attitude. One study found that a person's environmental risk

perception directly influences their perception of the environment's value and its importance, a key green attitude (Gao et al., 2019). This finding is significant for environmental campaigns, as it suggests that raising awareness of environmental threats could be an effective strategy for fostering a stronger pro-environmental mindset among the public (Gao et al., 2019). Research conducted among Chinese youth found that environmental risk perception significantly increased moral anger about environmental conditions, which is another way green attitude can be considered (Li et al., 2022). A third study investigated a specific environmental risk perception, that of "climate change health risk perception" (Shen et al., 2024). The authors found that climate change health risk perception had a significant and positive effect on pro-environmental attitudes (Shen et al., 2024). These studies indicate that environmental risk perception has a significant influence on green attitude, even across different cultural contexts and when modelled in different ways depending on the research topic. Therefore, the research investigates the following relationship as the second hypothesis:

Hypothesis 2: Environmental risk perception positively influences green attitude.

1.5 Green advertising and environmental concern

The third construct investigated is green advertising, which can be defined as "advertising that explicitly or implicitly promotes an awareness of environmental issues and/or suggests behaviors useful in minimizing or correcting these environmental issues (Fowler & Close, 2012, p. 121)." Green advertising draws attention to specific environmental issues and suggests consumer actions to address them (Fowler & Close, 2012). Prior research has indicated that green advertising can influence consumers' environmental concern. One study investigated the construal level of green advertising (Chang et al., 2015). (In advertising, construal level refers to whether individuals think about something like the environment in abstract (high-level) or concrete (low-level) terms, and whether they view it as something close to them or distant from them (Liberman et al., 2007).) The study found that matches between both loss framing (in which advertising messages convey the harm an individual may suffer if they do not act), contemplation of the negative consequences of a choice, and low-level construal, and gain framing (in which advertising messages convey the benefit an individual may receive if they do act), contemplation of the positive consequences of a choice, and high-level construal could influence environmental concern (as well as green attitudes) (Chang et al., 2015). Another study investigated the effect of lettering case used in green advertising (Song & Luximon, 2019). These authors found that the lettering case contributed to a fear arousal response, which in turn influenced environmental concern surrounding the issue being advertised. A third study investigated how green advertising

influenced consumers in different involvement contexts (Kong & Zhang, 2013). These authors found that in low-involvement contexts (i.e. purchases that do not require significant cognitive effort), green advertising appeals did influence environmental concern and subsequently concern-based decisions. However, in high-involvement contexts (i.e. purchases that did require significant cognitive effort), green advertising appeals had less effect (Kong & Zhang, 2013). A fourth study was recently conducted among buyers of organic foods in Ecuador (Carrión-Bósquez et al., 2024). These authors found that green advertising had a direct influence on environmental awareness. Therefore, based on the literature review, there is evidence that green advertising can influence environmental concern. However, this evidence is often based on a narrow aspect of the green advertising, such as message framing, and may not persist across all types of products/services. This research generalizes these findings to investigate the overall effect of green advertising on environmental concern:

Hypothesis 3: Green advertising positively influences environmental concern.

1.6 Green advertising and green attitude

Some of the studies that have investigated the role of green advertising on environmental concern have also found a relationship between green advertising and green attitudes (Chang et al., 2015; Song & Luximon, 2019). In Ecuador, it has been found that green advertising has a direct effect on environmental attitudes, although this effect was weaker than the effect observed for eco-label use (Carrión-Bósquez et al., 2024). An experiment conducted among young adult consumers found that green advertising appeals increased green attitudes toward products (Gahlot Sarkar, Sarkar, & Yadav, 2019). However, these findings were not consistent across product categories, with less impact of emotional appeals for all products, among other differences (Gahlot Sarkar et al., 2019). A study on green product purchases in Cambodia found a less direct relationship between green advertising and green attitudes (Liao et al., 2020). These authors found that green customer value (including the perceived value and environmental image of the products) did have a direct influence on attitudes toward green products. There was also a moderating effect of green marketing (including environmental advertising and green word of mouth, or GWOM) on the relationship between green attitudes and purchase intentions (Liao et al., 2020). This finding meant that increased exposure to green marketing intensified the relationship between green advertising and purchasing intentions. In summary, the role of green advertising on green attitudes is complex and may be reflected in different ways depending on the study framing. Overall, evidence indicates that green advertising as a stimulus is likely to influence green attitudes. Therefore, the following hypothesis is investigated:

Hypothesis 4: Green advertising positively influences green attitudes.

1.7 Environmental concern and purchase intention

There is evidence from prior studies that environmental concern has a direct influence on purchase intention for green products. De Canio et al. (2021), who investigated pro-environmental purchase intentions among Italian food shoppers, found that environmental concern had a direct effect on purchase intentions for green products. Their research also found that environmental concern moderated the effect of trust in sustainable producers on purchase intentions (De Canio et al., 2021). Another study also investigated sustainable consumption behavior among European consumers (Saari et al., 2021). The authors found that environmental concern strongly predicted purchase intentions for green products. Furthermore, environmental concern mediated the effect of environmental knowledge and environmental risk perception on sustainable consumption intention (Saari et al., 2021). In Ecuador, it was shown that environmental awareness had a direct relationship with green purchasing behavior (Carrión-Bósquez et al., 2024). This study also showed that environmental awareness positively moderated the relationship between eco-label usage and purchasing intention (Carrión-Bósquez et al., 2024). In other words, individuals with higher environmental awareness had a stronger relationship between eco-label usage and purchasing intention. Van Huy et al. (2023) did not find a direct influence of environmental concern on purchase intentions for green products but did find that it positively moderated the effects of other variables such as green ability (or perceived self-efficacy in relation to green consumption), green motivation (or intrinsic motivation to engage in green consumption), and green opportunity (or perceived opportunity to engage in green consumption) on green hotel stay intention. Overall, the prior evidence suggests that environmental concern does have a direct influence on purchase intentions for green products, although the exact nature of this relationship is complicated, as environmental concern may also moderate other relationships. This research investigates a direct relationship between the two variables:

Hypothesis 5: Environmental concern positively influences purchase intentions for green products.

1.8 Green attitude and purchase intention

The relationship between green attitude and green purchase intention was one of the most commonly studied relationships in the conceptual framework. Zeng et al. (2023), in their study of Chinese university students, found that environmental attitudes and environmental concern interacted to influence pro-environmental behavior, although green attitude did not have a direct effect on its own. In Ecuador, it was shown that environmental awareness directly influenced green

purchasing behavior, as well as moderating the relationships between green advertising and eco-label use and green purchasing behavior (Carrión-Bósquez et al., 2024). Among young Chinese consumers, perceptions of environmental value and moral anger surrounding environmental harm had a direct effect on pro-environmental behavior (Li et al., 2022). Additionally, in India, it was found that attitude had a direct influence on willingness to pay, as well as mediating the effects of collectivism, environmental concern, and interpersonal influence on willingness to pay (Kirmani & Khan, 2018). In Thailand, it was shown that green attitudes influenced purchase decisions for green products and mediated the effects of knowledge and awareness of packaging on the environment (Kingston & Paulraj, 2023). Another study in Thailand also showed a direct influence of attitudes toward green products on buying intention, although they did not test indirect effects (Maichum et al., 2016). Liao et al. (2020), who studied Cambodian consumers, found that attitudes toward green products had a significant and positive effect on green product purchase intentions. Also in China, it was shown that environmental value perceptions (one aspect of green attitudes) had a direct influence on environmental concern behavior as well as radical environmental behavior (Gao et al., 2019). Although this study was not directly in the context of consumer behavior, it does show that there is a strong relationship between green attitudes and individual behavioral choices in wider contexts. However, there was some inconsistency in the findings, which suggests that there could be different outcomes. For example, Shen et al. (2024) found that pro-environmental attitudes had a positive but non-significant effect on pro-environmental behavior. In summary, studies have shown that green attitudes do influence purchase intentions for green products across different research contexts, although there is some inconsistency in Shen et al.'s (2024) study. Therefore, the final hypothesis of the research is stated as:

Hypothesis 6: Green attitude positively influences purchase intentions for green products.

Figure 1 presents the conceptual framework for this study, illustrating how environmental risk perception and green advertising influence purchase intention. This relationship is mediated by environmental concern and green attitude.

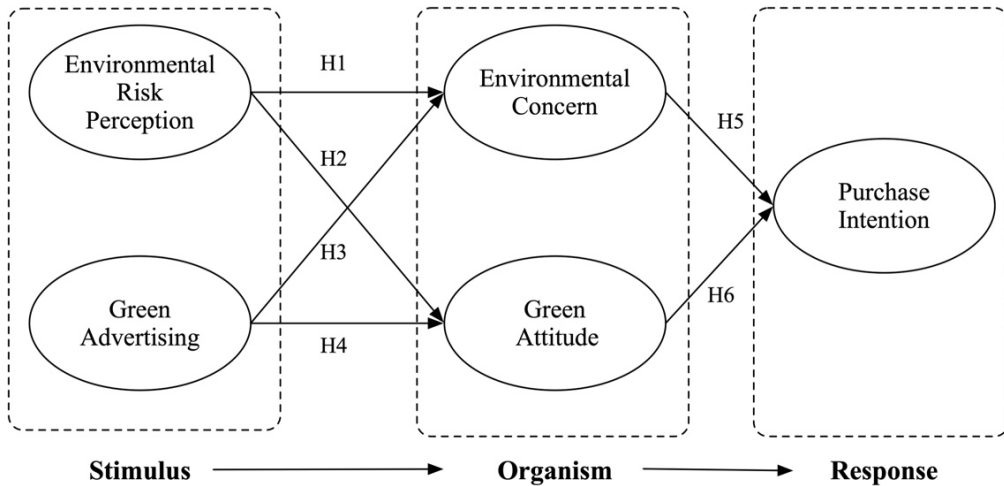


Figure 1 Conceptual framework of the research

Source: Authors

2. Methodology

2.1 Measurement

The research instrument was developed based on those used in prior studies to measure the same constructs. All items were measured using a five-point Likert scale, with interpretation points summarized below (Table 2). The Q-sort methodology was used to evaluate content validity prior to the distribution of the survey (Nahm, Rao, Solis-Galvan, & Ragu-Nathan, 2002). The Q-sort method uses an expert panel to determine the consistency of measurement items with theoretical constructs (Moore & Benbasat, 1991). A ratio is calculated for each round, representing the extent of expert placement within the expected theoretical construct for individual scale items (McKeown & Thomas, 2013). A total of three rounds of assessment were used for these items. In the first round, agreement was 71.4 percent, which represented low content validity (McKeown & Thomas, 2013). Following revisions, the second round showed significant improvement, with agreement at 90.9 percent. By the third round, agreement between expert placement and theoretical placement was 95.5 percent, representing adequate content validity (McKeown & Thomas, 2013).

Table 2 Summary of the research instrument

Construct	Items	Source
Environmental Risk Perception	RP1. How concerned are you about climate change? RP2. How serious a threat do you believe climate change is to you personally? RP3. How serious a threat do you think climate change is to the environment? RP4. How serious would you rate the current impacts of climate change around the world? RP5. How serious do you estimate the impact of climate change to be in Thailand?	Xie, Brewer, Hayes, McDonald, & Newell (2019)
Green Advertising	GAD1. I tend to pay attention to advertising messages that focus on the environment. GAD2. The use of green messages in ads affects my attitude toward them. GAD3. I respond favourably to brands that use green messages in their advertising. GAD4. I think green advertising is valuable. GAD5. I am the kind of consumer who is willing to purchase products marketed as green. GAD6. I support brands that support the environment.	Bailey, Mishra, & Tiamiyu (2016)
Environmental Concern	EC1. I do what is right for the environment, even when it costs more money or takes more time. EC2. How willing are you to pay much higher prices in order to protect the environment? EC3. How willing would you be to pay much higher taxes in order to protect the environment?	Franzen & Vogl (2013)
Green Attitude	GAT1. I feel good about buying products which are less damaging to the environment. GAT2. I am willing to make a special effort to buy products which are made from recycled materials. GAT3. I prefer environmentally friendly products over non-environmentally friendly products in cases where product quality is similar.	Kirmani & Khan (2018)

Table 2 Summary of the research instrument (continued)

Construct	Items	Source
Purchase Intention	PI1. I plan to purchase more green products rather than normal products. PI2. I will consider switching to eco-friendly brands for ecological reasons. PI3. When I have a choice between two equal products, I prefer to buy the one with environmentally friendly packaging. PI4. I prefer to buy products with recyclable and reusable packaging. PI5. I am willing to carry cloth bags for the things I buy.	Kingston & Paulraj (2023), Maichum et al. (2016)

Note: Measurements: 1 = not at all/strongly disagree; 2 = a little/disagree; 3 = somewhat/neutral; 4 = very/agree; 5 = strongly/strongly agree

Source: Authors

2.2 Population and sample

The population for this study consisted of Thai consumers aged 18 and over. Thai consumers represent a significant market and are increasingly active on online platforms, making them a relevant demographic for a study on green attitudes and purchasing behavior. The sample (n=450) was selected using online convenience sampling during April – June 2024. As online convenience sampling is most effective when samples from several different sources can be pooled (Winton & Sabol, 2022), a mixed approach to sampling was used, including a crowdsourced sample and a response-driven social network sample. These two samples were then combined. To ensure methodological rigor, the sample size was justified based on Krejcie & Morgan's (1970) recommendations for a population of over 1 million, which suggests a minimum sample size of 384. Our sample of 450 exceeds this recommendation, providing sufficient statistical power for the analysis.

Demographic characteristics of the sample are summarized in Table 3. As shown, there were slightly more female than male participants, and most respondents were between 20 and 40 years old. Most participants also held higher education degrees.

Table 3 Demographics of the sample

	N	%
<i>Gender</i>		
Female	243	54
Male	189	42
Other/Did not specify	18	4
<i>Age (Years)</i>		
18 to 20	18	4
20 to 30	72	16
31 to 40	216	48
41 to 50	36	8
Over 50	108	24
<i>Highest Education Level</i>		
High school or lower	27	6
Bachelor's	243	54
Master's	162	36
PhD/Terminal degree	18	4

Source: Authors

2.3 Data collection

Data were collected using an online survey. Participants were recruited through a combination of direct recruitment via social media groups on platforms such as Facebook and LinkedIn, and network recruitment through referrals from prior participants.

2.4 Data analysis

The data analysis was conducted in STATA 17. The analysis began with the construction of index variables, which consisted of unweighted sums of items in each scale, respectively. The authors inspected the scale's internal consistency reliability by examining the Cronbach's alpha. Furthermore, to ensure that the result did not suffer from multicollinearity bias, the VIF test was performed. The results (Tables A1 and A2) showed good internal consistency and no evidence of multicollinearity. Descriptive statistics and correlations were calculated for each index variable. Additionally, Harman's single-factor test was used to investigate common method bias (Podsakoff & Organ, 1986). Finally, inferential statistics were used to investigate Hypotheses 1 to 6. These hypotheses were tested using ordinary least squares (OLS) regression (Thrane, 2020).

3. Findings

3.1 Descriptive statistics, correlations, and common method bias

Descriptive statistics for the index variables, which were prepared using unweighted sums of all scale variables and then normalized, are summarized in Table 4. The lowest mean was observed for environmental concern ($M = 30.26$, $SD = 5.44$), while the highest mean was observed for green attitudes ($M = 36.32$, $SD = 5.36$).

Skewness and kurtosis were used to evaluate the normal distribution of variables (Hair, Babin, Black, & Anderson, 2019). For skewness, a range of -2 to +2 is considered evidence of acceptable normal distribution for multivariate analysis (Hair et al., 2019). All variables fell within this range. For kurtosis, a range of -7 to +7 is viewed as acceptably normal (Hair et al., 2019). Once again, all variables met this requirement. Therefore, the descriptive statistics support the normal distribution of the variables, which is one of the assumptions of linear regression (Thrane, 2020).

Table 4 Descriptive statistics

Variable	Mean	SD	Skewness	Kurtosis
Environmental Risk Perception	31.89	3.57	-1.45	5.46
Green Advertising	35.19	5.44	-0.80	3.74
Environmental Concern	30.26	7.04	-0.62	4.13
Green Attitudes	36.32	5.36	-0.95	3.43
Purchase Intention	35.27	5.24	-0.80	3.47

Source: Authors

Correlations are summarized in Table 5. While there were some high correlations between green advertising and environmental concern ($r = 0.531$) and between green advertising and green attitudes ($r = 0.572$), these are internal relationships tested within the model and therefore did not pose a threat to discriminant validity. Overall, there were no strong correlations between theoretically unrelated variables.

Table 5 Correlations

	(1)	(2)	(3)	(4)	(5)
(1) Environmental Risk Perception	1.000				
(2) Green Advertising	0.333	1.000			
(3) Environmental Concern	0.343	0.532	1.000		
(4) Green Attitudes	0.358	0.571	0.430	1.000	
(5) Purchase Intention	0.383	0.585	0.587	0.685	1.000

Source: Authors

Common method bias was assessed using Harman's single-factor test, in which all items are loaded onto a single factor and factor analysis is used to determine the highest level of variance explained by one factor. The result (single-factor variance = 0.26) indicated that the maximum variance explained by a single factor was 26 percent. This is below the threshold value of 0.50, which would indicate that half or more of the variance in the model could be explained by a single factor (Fuller, Simmering, Atinc, Atinc, & Babin, 2016). Therefore, there was no concern about common method bias in the research.

3.2 Regressions and hypothesis test outcomes

The baseline regression (Table 6) showed that environmental risk perception had a significant and positive effect on environmental concern ($\beta = 0.329$, $z = 3.00$, $p = 0.003$). Green advertising also had a significant and positive effect on environmental concern ($\beta = 0.468$, $t = 7.09$, $p = 0.000$). Environmental risk perception also had a significant and positive effect on green attitude ($\beta = 0.311$, $z = 3.50$, $p = 0.000$), as did green advertising ($\beta = 0.424$, $z = 7.02$, $p = 0.000$). Finally, environmental concern had a significant and positive effect on purchase intention ($\beta = 0.361$, $z = 5.91$, $p = 0.000$), and green attitudes also had a significant and positive effect on purchase intention ($\beta = 0.860$, $z = 7.77$, $p = 0.000$).

Bootstrapping was used to increase the certainty in the model and as the basis for the hypothesis tests (Eck, 2018; Freedman, 1981). Results are shown in Table 7. The bootstrapping test showed no areas of significant difference from the baseline regression.

Table 6 Baseline regression

	Beta	Std. Dev	Z	P	95% Confidence Level	
<i>Environmental Concern</i>						
Environmental Risk Perception	0.329	0.1099	3.00	0.003**	0.1140	0.5448
Green Advertising	0.468	0.0659	7.09	0.000***	0.3384	0.5968
R ²	0.38					
<i>Green Attitude</i>						
Environmental Risk Perception	0.311	0.0889	3.50	0.000***	0.1371	0.4856
Green Advertising	0.424	0.0604	7.02	0.000***	0.3053	0.5420
R ²	0.52					
<i>Purchase Intention</i>						
Environmental Concern	0.361	0.0611	5.91	0.000***	0.2410	0.4804
Green Attitudes	0.860	0.1107	7.77	0.000***	0.6434	1.0772
R ²	0.76					

Note: * p < .05; ** p < .01; *** p < .001

Source: Authors

Table 7 Bootstrapping analysis

	Beta	Std. Dev.	Z	P	95% Confidence Level	
<i>Environmental Concern</i>						
Environmental Risk Perception	0.329	0.1355	2.43	0.015*	0.0638	0.5949
Green Advertising	0.468	0.1024	4.57	0.000 ***	0.2669	0.6683
<i>Green Attitude</i>						
Environmental Risk Perception	0.311	0.1031	3.02	0.003 **	0.1092	0.5134
Green Advertising	0.424	0.0843	5.02	0.000 ***	0.2583	0.5889
<i>Purchase Intention</i>						
Environmental Concern	0.360	0.0856	4.21	0.000 ***	0.1929	0.5285
Green Attitudes	0.860	0.1502	5.73	0.000 ***	0.5660	1.1547

Note: * p < .05; ** p < .01; *** p < .001

Source: Authors

Hypothesis outcomes are summarized in Table 8. Regarding the effects of environmental risk perception, Hypothesis 1 proposed that environmental risk perception would influence environmental concern. The regression test confirmed that this effect was significant and positive ($\beta = 0.329$, $p = 0.015$). Therefore, H1 was supported. Hypothesis 2 stated that environmental risk perception would also influence green attitudes. Results indicated a positive and significant influence of environmental risk perception on green attitudes ($\beta = 0.311$, $p = 0.003$). Therefore, H2 was also supported.

Regarding the effects of green advertising, Hypothesis 3 proposed that green advertising would influence environmental concern as well. The regression test results ($\beta = 0.468$, $p = 0.000$) confirmed that this effect was positive and significant. Therefore, H3 was supported. Hypothesis 4 stated that green advertising would have a significant effect on green attitude. With a positive and significant effect observed ($\beta = 0.424$, $p = 0.000$), H4 was also supported.

Regarding environmental concern and purchase intentions, Hypothesis 5 examined the effect of environmental concern on purchase intentions within the model. The regression results showed a positive and significant effect of environmental concern on purchase intentions ($\beta = 0.360$, $p = 0.000$). Therefore, H5 was supported.

Finally, regarding green attitudes and purchase intentions, Hypothesis 6 proposed that green attitudes would have a significant effect on purchase intentions. The regression tests showed a positive and significant effect of green attitudes on purchase intentions ($\beta = 0.860$, $p = 0.000$). Therefore, H6 was supported.

Table 8 Summary of hypothesis outcomes

Hypothesis		Outcome
1	Environmental risk perception → Environmental concern	Supported
2	Environmental risk perception → Green attitude	Supported
3	Green advertising → Environmental concern	Supported
4	Green advertising → Green attitude	Supported
5	Environmental concern → Purchase intentions	Supported
6	Green attitude → Purchase intention	Supported

Source: Authors

4. Discussion

Environmental risk perception was proposed as one of the external stimuli in the S-O-R model, which represent external conditions in the environment that trigger internal processing (Buxbaum, 2016). Environmental risk perception was found to have a significant effect on both environmental concern and green attitude. According to De Canio et al. (2021), environmental risk perception influences a wide array of consumer decisions, so it was expected to affect both, as the findings confirmed. This result is also consistent with a range of empirical research showing that environmental risk perception influences both environmental concern (Gao et al., 2019; Saari et al., 2021; Zeng et al., 2023) and green attitude (Gao et al., 2019; Li et al., 2022; Shen et al., 2024; Van Huy et al., 2023). Taken together, these findings suggest that environmental risk perception should be considered an external stimulus with a broad influence on an individual's internal psychological and cognitive processing of the environment and its significance for them.

Green advertising also played a role in both environmental concern and green attitude. Like environmental risk perception, green advertising was considered as an external stimulus (Buxbaum, 2016). Green advertising is a complex phenomenon which has not been investigated fully by previous authors. While studies have explored aspects such as message framing (Chang et al., 2015) and even lettering (Song & Luximon, 2019), as well as involvement contexts (Kong & Zhang, 2013), our research is among the few that investigates the overall effect of consumer perception of green advertising on both environmental concern and green attitude, while also accounting for the context of greenwashing, or misleading advertising that makes environmental claims about the company or its products (de Freitas Netto et al., 2020). Because it can be difficult for consumers to distinguish between greenwashing and sincere green advertising (de Freitas Netto et al., 2020), this could cause consumers to discount or be suspicious of claims in green advertising altogether. Only one other study was identified that investigated the overall effect of green advertising on environmental concern (Carrión-Bósquez et al., 2024). A few more studies have examined how green advertising influences green attitudes, but these findings were somewhat inconsistent (Carrión-Bósquez et al., 2024; Chang et al., 2015; Gahlot Sarkar et al., 2019; Liao et al., 2020; Song & Luximon, 2019). Given this complex situation, this research contributes by showing that consumer perceptions of green advertising do play a role in the internal formation of attitudes and beliefs about the environment.

Environmental concern had a direct influence on purchase intentions. This effect was anticipated, given that individuals with high environmental concern typically have both more skeptical attitudes towards marketing and greater concern for their personal consumption levels (De Canio et al., 2021). While the S-O-R model does not always predict unemotional consumption

choices (Vieira, 2013), in this study, environmental concern (along with green attitudes) clearly had an emotional impact on consumers. This study aligns with several others that have shown environmental concern is associated with purchase intentions for green products (Carrión-Bósquez et al., 2024; De Canio et al., 2021; Saari et al., 2021; Van Huy et al., 2023). However, this finding has an important implication for marketers, as high levels of environmental concern may also reduce overall consumption (De Canio et al., 2021). Thus, this creates a challenge for marketers, as consumers may buy less overall while still preferring green brands. Resolving this dilemma would be a fruitful avenue for future research.

Finally, green attitude also had a direct influence on purchase intentions. The role of green attitude in influencing purchase intentions for green products was one of the most commonly identified relationships in the literature review (Carrión-Bósquez et al., 2024; Gao et al., 2019; Kingston & Paulraj, 2023; Kirmani & Khan, 2018; Li et al., 2022; Liao et al., 2020; Maichum et al., 2016; Zeng et al., 2023). Our research demonstrates that it is influenced by both environmental risk perception and green advertising, showing that green attitudes do not arise from nothing, but are instead influenced heavily by the external environment. This finding has significant implications for marketers, as it strongly indicates that green attitudes are an antecedent to purchasing green products. Marketers must, therefore, find ways to appeal to existing green attitudes or promote their development.

5. Conclusion

This study set out to understand what factors influenced green purchase intentions. A conceptual model was developed that positioned environmental risk perception and green advertising as external stimuli, environmental concern and green attitudes as internal cognitions (the 'organism' component), and purchase intentions for green products as the response. The model was then tested on a sample of Thai consumers. The test of the conceptual framework showed that environmental risk perception and green advertising influenced both environmental concern and green attitudes. Furthermore, environmental concern and green attitudes both positively influenced purchase intentions for green consumer products. Thus, the conceptual model effectively explained purchase intention for green consumer products based on the S-O-R theory.

There are several implications for both theory and practice that can be derived from this research. Theoretically, this research offers several key contributions to the existing literature. First, it successfully applied the S-O-R (Stimulus-Organism-Response) framework to a green consumption context in Thailand. This provided a culturally specific validation of the model,

demonstrating its utility in a developing market where environmental consciousness is rapidly evolving. The study's findings confirm the roles of environmental risk perception and green advertising as significant external stimuli (S). More importantly, it clarifies their distinct yet simultaneous influence on an individual's internal psychological state (O), namely environmental concern and green attitude. This is a novel contribution as previous studies often examined these stimuli in isolation. By showing that green attitudes and environmental concern act as intermediating variables between the external environment (green advertising and environmental risk perception) and consumer actions (green purchase intention), this research enriches the understanding of the internal processing mechanisms that link external environmental cues to a consumer's green purchase intentions (R). For marketers, it is crucial to understand consumers' environmental concerns and attitudes. These internal factors drive purchase decisions more effectively than green advertising.

There are some constraints to how far the findings could be generalized. The research included only Thai consumers and was conducted during a period of particularly high concern for the environment. This leads to valuable information from a specific culture and time and is relevant to broader understanding of how different cultural groups may respond to green advertising, and the S-O-R model may be more applicable in more emotional or involved decision contexts. However, it means that findings may not be directly applicable to other consumer groups. Another limitation is that the study investigated only a limited number of environmental cognitions (environmental concern and green attitude). This limitation was chosen to avoid threatening the discriminant validity of the model, as there is significant overlap between some environmental cognition constructs. These are areas where the literature could be extended to more fully investigate purchase intentions for green products from a comparative perspective and to examine how different types of environmental cognition could influence outcomes differently. A further opportunity for research lies in the final limitation, which is that interactions between explanatory variables were not tested. This could be incorporated into future research.

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Appendix

Table A1 Internal consistency test

Variable	Cronbach's Alpha
Environmental Risk Perception	0.8557
Green Advertising	0.8939
Environmental Concern	0.8643
Green Attitudes	0.7697
Purchase Intention	0.8421

Source: Authors

Table A2 Variance Inflation Factor (VIF)

Independent Variable	VIF
Environmental Risk Perception	1.28
Green Advertising	2.04
Environmental Concern	1.54
Green Attitudes	1.69
Average VIF	1.64

Source: Authors

References

- Bailey, A. A., Mishra, A., & Tiarniyu, M. F. (2016). Green consumption values and Indian consumers' response to marketing communications. *Journal of Consumer Marketing*, 33(7), 562-573. <https://doi.org/10.1108/JCM-12-2015-1632>
- Bala, R., Singh, S., & Sharma, K. K. (2023). Relationship between environmental knowledge, environmental sensitivity, environmental attitude and environmental behavioural intention – a segmented mediation approach. *Management of Environmental Quality: An International Journal*, 34(1), 119-136. <https://doi.org/10.1108/MEQ-08-2021-0202>
- Blanco-Encomienda, F. J., & Rosillo-Díaz, E. (2025). Exploring brand attitude in e-commerce using the S-O-R model: the role of information quantity, information quality and source credibility. *Journal of Product & Brand Management*, 34(7), 1041-1055. <https://doi.org/10.1108/JPBM-04-2024-5095>

- Buxbaum, O. (2016). The S-O-R-Model. In *Key Insights into Basic Mechanisms of Mental Activity* (pp. 7-9). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-29467-4_2
- Carrión-Bósquez, N. G., Ortiz-Regalado, O., Veas-González, I., Naranjo-Armijo, F. G., & Guerra-Regalado, W. F. (2024). The mediating role of attitude and environmental awareness in the influence of green advertising and eco-labels on green purchasing behaviors. *Spanish Journal of Marketing - ESIC*. <https://doi.org/10.1108/SJME-08-2023-0217>
- Chang, H., Zhang, L., & Xie, G.-X. (2015). Message framing in green advertising: the effect of construal level and consumer environmental concern. *International Journal of Advertising*, 34(1), 158-176. <https://doi.org/10.1080/02650487.2014.994731>
- Cruz, S. M., & Manata, B. (2020). Measurement of environmental concern: A review and analysis. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.00363>
- De Canio, F., Martinelli, E., & Endrighi, E. (2021). Enhancing consumers' pro-environmental purchase intentions: the moderating role of environmental concern. *International Journal of Retail & Distribution Management*, 49(9), 1312-1329. <https://doi.org/10.1108/IJRDM-08-2020-0301>
- de Freitas Netto, S. V., Sobral, M. F. F., Ribeiro, A. R. B., & Soares, G. R. da L. (2020). Concepts and forms of greenwashing: a systematic review. *Environmental Sciences Europe*, 32(1), 19. <https://doi.org/10.1186/s12302-020-0300-3>
- Eck, D. J. (2018). Bootstrapping for multivariate linear regression models. *Statistics & Probability Letters*, 134, 141-149. <https://doi.org/10.1016/j.spl.2017.11.001>
- Fowler, A. R., & Close, A. G. (2012). It ain't easy being green: Macro, meso, and micro green advertising agendas. *Journal of Advertising*, 41(4), 119-132. <https://doi.org/10.1080/00913367.2012.10672461>
- Franzen, A., & Vogl, D. (2013). Two decades of measuring environmental attitudes: A comparative analysis of 33 countries. *Global Environmental Change*, 23(5), 1001-1008. <https://doi.org/10.1016/j.gloenvcha.2013.03.009>
- Freedman, D. A. (1981). Bootstrapping regression models. *The Annals of Statistics*, 9(6). <https://doi.org/10.1214/aos/1176345638>
- Fuller, C. M., Simmering, M. J., Atinc, G., Atinc, Y., & Babin, B. J. (2016). Common methods variance detection in business research. *Journal of Business Research*, 69(8), 3192-3198. <https://doi.org/10.1016/j.jbusres.2015.12.008>
- Gahlot S., J., Sarkar, A., & Yadav, R. (2019). Brand it green: young consumers' brand attitudes and purchase intentions toward green brand advertising appeals. *Young Consumers*, 20(3), 190-207. <https://doi.org/10.1108/YC-08-2018-0840>

- Gao, S., Li, W., Ling, S., Dou, X., & Liu, X. (2019). An empirical study on the influence path of environmental risk perception on behavioral responses in China. *International Journal of Environmental Research and Public Health*, 16(16), 2856. <https://doi.org/10.3390/ijerph16162856>
- Hair, J. F., Babin, B. J., Black, W. C., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage.
- Henry, A. D., & Dietz, T. (2012). Understanding environmental cognition. *Organization & Environment*, 25(3), 238-258. <https://doi.org/10.1177/1086026612456538>
- Janmaimool, P., & Chudech, S. (2020). Effect of domestic and global environmental events on environmental concern and environmental responsibility among university students. *Sustainability*, 12(4), 1610. <https://doi.org/10.3390/su12041610>
- Jiang, J., Gao, B. W., & Su, X. (2022). Antecedents of tourists' environmentally responsible behavior: The perspective of awe. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.619815>
- Kingston, A., & Paulraj, G. (2023). Purchasing practice of young consumers towards green packaging: influence of value system with the mediating effect of attitude. *Sustainability, Agri, Food and Environmental Research*, 12(1). <https://doi.org/10.7770/safer-V12N1-art2622>
- Kirmani, M. D., & Khan, M. N. (2018). Decoding willingness of Indian consumers to pay a premium on green products. *South Asian Journal of Business Studies*, 7(1), 73-90. <https://doi.org/10.1108/SAJBS-11-2016-0091>
- Kong, Y., & Zhang, A. (2013). Consumer response to green advertising: The influence of product involvement. *Asian Journal of Communication*, 23(4), 428-447. <https://doi.org/10.1080/01292986.2013.774433>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610. <https://doi.org/10.1177/001316447003000308>
- Larson, R. B., & Kinsey, J. (2019). Culture and sampling issues with "Green" attitude research. *Social Marketing Quarterly*, 25(2), 91-106. <https://doi.org/10.1177/1524500419838989>
- Li, X., Liu, Z., & Wuyun, T. (2022). Environmental value and pro-environmental behavior among young adults: The mediating role of risk perception and moral anger. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.771421>
- Liao, Y.-K., Wu, W.-Y., & Pham, T.-T. (2020). Examining the moderating effects of green marketing and green psychological benefits on customers' green attitude, value and purchase intention. *Sustainability*, 12(18), 7461. <https://doi.org/10.3390/su12187461>

- Liberman, N., Trope, Y., & Wakslak, C. (2007). Construal level theory and consumer behavior. *Journal of Consumer Psychology*, 17(2), 113-117. [https://doi.org/10.1016/S1057-7408\(07\)70017-7](https://doi.org/10.1016/S1057-7408(07)70017-7)
- Maartensson, H., & Loi, N. M. (2022). Exploring the relationships between risk perception, behavioural willingness, and constructive hope in pro-environmental behaviour. *Environmental Education Research*, 28(4), 600-613. <https://doi.org/10.1080/13504622.2021.2015295>
- Maichum, K., Parichatnon, S., & Peng, K.-C. (2016). Application of the extended theory of planned behavior model to investigate purchase intention of green products among Thai consumers. *Sustainability*, 8(10), 1077. <https://doi.org/10.3390/su8101077>
- McKeown, B., & Thomas, D. B. (2013). *Q methodology* (2nd ed.). London: Sage Publications.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.
- Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2(3), 192-222. <https://doi.org/10.1287/isre.2.3.192>
- Nahm, A. Y., Rao, S. S., Solis-Galvan, L. E., & Ragu-Nathan, T. S. (2002). The Q-sort Method: Assessing reliability and construct validity of questionnaire items at a pre-testing stage. *Journal of Modern Applied Statistical Methods*, 1(1), 114-125. <https://doi.org/10.22237/jmasm/1020255360>
- Nguyen-Viet, B. (2022). Understanding the influence of eco-label, and green advertising on green purchase intention: The mediating role of green brand equity. *Journal of Food Products Marketing*, 28(2), 87-103. <https://doi.org/10.1080/10454446.2022.2043212>
- Oludoye, O. O., Supakata, N., Srithongouthai, S., Kanokkantapong, V., Van den Broucke, S., Ogunyebi, L., & Lubell, M. (2024). Pro-environmental behavior regarding single-use plastics reduction in urban–rural communities of Thailand: Implication for public policy. *Scientific Reports*, 14(1), 4713. <https://doi.org/10.1038/s41598-024-55192-5>
- Ou, X. (2025, December 17). Sustainable consumption in Thailand. Statista. https://www.statista.com/topics/11080/sustainable-consumption-in-thailand/?srsltid=AfmBOorxU7uXkhDiU2IOwlsB9q6xp1nvAXAAr_5Vvh0hojw0jelmzXP7
- Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, 12(4), 531-544. <https://doi.org/10.1177/014920638601200408>

- Ribeiro, M. A., Seyfi, S., Elhoushy, S., Woosnam, K. M., & Patwardhan, V. (2025). Determinants of generation Z pro-environmental travel behaviour: The moderating role of green consumption values. *Journal of Sustainable Tourism*, 33(6), 1079-1099. <https://doi.org/10.1080/09669582.2023.2230389>
- Ruanguttamanun, C. (2023). How consumers in different cultural backgrounds prefer advertising in green ads through Hofstede's cultural lens? A cross-cultural study. *Global Business and Organizational Excellence*, 43(1), 35-52. <https://doi.org/10.1002/joe.22192>
- Saari, U. A., Damberg, S., Frömbing, L., & Ringle, C. M. (2021). Sustainable consumption behavior of Europeans: The influence of environmental knowledge and risk perception on environmental concern and behavioral intention. *Ecological Economics*, 189, 107155. <https://doi.org/10.1016/j.ecolecon.2021.107155>
- Shen, T., Rasdi, I. B., Ezani, N. E. B., & San, O. T. (2024). The mediating role of pro-environmental attitude and intention on the translation from climate change health risk perception to pro-environmental behavior. *Scientific Reports*, 14(1), 9831. <https://doi.org/10.1038/s41598-024-60418-7>
- Song, Y., & Luximon, Y. (2019). Design for Sustainability: The effect of lettering case on environmental concern from a green advertising perspective. *Sustainability*, 11(5), 1333. <https://doi.org/10.3390/su11051333>
- Stephens, D. (2017). *Essentials of consumer behavior*. Routledge.
- Thakur, R., & Srivastava, M. (2015). A study on the impact of consumer risk perception and innovativeness on online shopping in India. *International Journal of Retail & Distribution Management*, 43(2), 148-166. <https://doi.org/10.1108/IJRDM-06-2013-0128>
- Thrane, C. (2020). *Applied regression analysis: Doing, interpreting and reporting*. New York: Routledge.
- Udalov, V., & Welfens, P. J. J. (2021). Digital and competing information sources: Impact on environmental concern and prospects for international policy cooperation. *International Economics and Economic Policy*, 18(4), 631-660. <https://doi.org/10.1007/s10368-021-00503-8>
- Usman, M., Balsalobre-Lorente, D., Jahanger, A., & Ahmad, P. (2022). Pollution concern during globalization mode in financially resource-rich countries: Do financial development, natural resources, and renewable energy consumption matter? *Renewable Energy*, 183, 90-102. <https://doi.org/10.1016/j.renene.2021.10.067>

- Van Huy, L., Nguyen, H. T. T., Hoang Long, P., Quyen Phu Thi, P., & Tan Nhat, P. (2023). Going green: predicting tourists' intentions to stay at eco-friendly hotels – the roles of green attitude and environmental concern. *Journal of Hospitality and Tourism Insights*. <https://doi.org/10.1108/JHTI-05-2023-0355>
- Vieira, V. A. (2013). Stimuli–organism–response framework: A meta-analytic review in the store environment. *Journal of Business Research*, 66(9), 1420-1426. <https://doi.org/10.1016/j.jbusres.2012.05.009>
- Winton, B. G., & Sabol, M. A. (2022). A multi-group analysis of convenience samples: free, cheap, friendly, and fancy sources. *International Journal of Social Research Methodology*, 25(6), 861-876. <https://doi.org/10.1080/13645579.2021.1961187>
- Xie, B., Brewer, M. B., Hayes, B. K., McDonald, R. I., & Newell, B. R. (2019). Predicting climate change risk perception and willingness to act. *Journal of Environmental Psychology*, 65, 101331. <https://doi.org/10.1016/j.jenvp.2019.101331>
- Zaiem, I., Sobaih, A. E. E., Gharbi, H., & Aliane, N. (2025). Think green, buy green? The role of green attitude and pro-environmental behaviour in the link between perceived policy effectiveness and green purchase intention. *Cogent Business & Management*, 12(1). <https://doi.org/10.1080/23311975.2025.2557974>
- Zeng, Z., Zhong, W., & Naz, S. (2023). Can environmental knowledge and risk perception make a difference? The role of environmental concern and pro-environmental behavior in fostering sustainable consumption behavior. *Sustainability*, 15(6), 4791. <https://doi.org/10.3390/su15064791>