

EXTENDING THE THEORY OF PLANNED BEHAVIOR: THE ROLE OF ANTICIPATED NEGATIVE EMOTIONS IN PLANT-BASED FOOD PURCHASE INTENTIONS IN THAILAND

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Abstract

Purpose: This study aims to extend the Theory of Planned Behavior (TPB) by integrating Anticipated Negative Emotions (ANE) to improve the prediction of consumers' purchase intentions toward plant-based foods. Understanding these intentions is crucial for promoting sustainable dietary transitions and responsible consumption behavior. While TPB provides a strong theoretical foundation, it often overlooks the emotional influences that play a critical role in ethical and sustainability-related food choices.

Study Design/Methodology/Approach: A quantitative survey was conducted among 400 Thai consumers who had previously purchased plant-based foods. Data were collected through online questionnaires distributed across relevant social media communities during February and March 2025. Multiple and hierarchical regression analyses were employed to examine the influence of the demographic variables, TPB constructs, and ANE on purchase intention, and to compare the predictive power of the traditional and extended TPB models.

Findings: The extended TPB model accounted for 44.9% of the variance in purchase intention, representing a significant improvement over the traditional TPB model (41.8%). Subjective norms emerged as the most influential predictor, followed by ANE. Unexpectedly, positive attitudes were positively associated with ANE, whereas subjective norms and perceived behavioral control negatively affected ANE.

Originality/Value: The study underscores the importance of emotional mechanisms—particularly anticipated guilt and regret—in understanding sustainable food decisions. By incorporating emotional dimensions into TPB, this research contributes new theoretical insights and provides practical implications for designing marketing strategies that integrate both rational and emotional elements to promote responsible and sustainable consumption.

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Introduction

Plant-based foods have gained remarkable traction worldwide as consumers increasingly seek sustainable and health-conscious dietary alternatives, supporting both sustainable food systems and responsible consumption patterns. This shift reflects growing awareness of interconnections between food choices and broader societal challenges, including public health concerns, environmental degradation, and animal welfare issues (Godfray et al., 2018; Willett et al., 2019). The global plant-based food market is projected to expand from USD 51.88 billion in 2024 to USD 238.9 billion by 2035, representing a Compound Annual Growth Rate (CAGR) of 10.7-14.9% (Market Research Report, 2025). Regional adoption patterns vary considerably based on cultural, economic, and demographic factors. North America leads the market with USD 5.02 billion in 2024, driven primarily by Generation Z and Millennial consumers (Precedence Research, 2025). Europe follows with USD 3.76 billion, while the Asia-Pacific region, though smaller at USD 2.88 billion, shows promising growth potential with forecasted annual increases of 11-14% through 2030 (Mobility Foresights, 2025). Future expansion is anticipated to focus on Asia-Pacific, where rapid urbanization and rising health consciousness drive adoption, with China leading regional development.

The rapid expansion of the global plant-based food market is driven not only by product innovation but also by profound shifts in consumer values. Three interrelated dynamics underpin this growth: health consciousness, ethical concern, and sustainability. Health-oriented consumers increasingly seek alternatives to processed and red meat to reduce the risk of non-communicable diseases, while ethically motivated consumers pay greater attention to animal welfare and wish to reduce their complicity in intensive livestock systems. At the same time, environmentally conscious consumers view plant-based foods as a way to lower resource use and carbon footprints compared with conventional animal-based products. These motivations are no longer limited to strict vegetarians or vegans; rather, an emerging flexitarian segment, who intentionally reduce meat consumption without eliminating it entirely, has become a key mass-market driver of plant-based food adoption worldwide (CCPA Group, 2024).

The drivers behind this industry expansion are complex and interconnected, reflecting global commitments to sustainable development. The livestock sector contributes approximately 60% of food system greenhouse gas emissions, playing a substantial role in climate change (González et al., 2020). Simultaneously, epidemiological evidence links high meat consumption with increased risk of non-communicable diseases (Chung et al., 2021; World Health Organization, 2025). International organizations, including the FAO and UN, have endorsed dietary transitions toward plant-based consumption as essential for addressing climate change and promoting sustainable consumption patterns, contributing to the emergence of flexitarian consumers who now represent nearly half of global consumers

(CCPA Group, 2024). Despite these global trends toward sustainable consumption, research on plant-based food consumption remains geographically skewed toward Western markets (Faber et al., 2020), creating significant knowledge gaps in Asian contexts where plant-forward eating has deep cultural roots supporting sustainable food systems. This disparity is particularly notable given that countries such as Thailand, China, and India have historically incorporated plant-based foods as fundamental components of their traditional cuisines.

According to Kasikorn Research Center, more than 7.2 million Thais do not consume meat, and the alternative protein market derived from new food innovations is valued at THB 9.7 billion, growing by 3.2% in 2024 (Kasikorn Research Center, 2024). The plant protein market in Thailand has expanded robustly during 2020-2024, registering a Compound Annual Growth Rate (CAGR) of 27.1%. This upward trajectory is expected to persist, with forecasts indicating a CAGR of 18.9% for the period 2025-2029. By the end of 2029, the market is projected to grow from a valuation of 53.1 million USD in 2024 to approximately 161.2 million USD (Research and Markets, 2025). This growth trajectory is not confined to strictly vegetarian or vegan consumers but is strongly propelled by the emerging “flexitarian” segment, which accounts for a substantial share of Thai consumers who intentionally reduce meat consumption to promote better health outcomes and to mitigate adverse ecological impacts. The rapid expansion of Thailand’s plant-based food market is significantly associated with more sustainable consumer behavior, particularly among health-conscious individuals and those concerned with environmental responsibility. However, impressive market growth figures alone do not guarantee sustained consumer adoption. Effective market penetration requires elucidating the psychological mechanisms—Particularly emotional determinants—that translate purchase intentions into actual behavior beyond mere product availability (Escadas et al., 2019). Thailand faces a critical research gap regarding the psychological factors influencing consumer intention to purchase plant-based foods within sustainable food systems. Existing studies have predominantly focused on rational factors such as health benefits and environmental concerns, yet awareness alone does not consistently predict responsible consumption (Schuitema & de Groot, 2015). The translation from intention to action proves more complex than traditional models suggest, as food choices are inherently personal and culturally embedded, involving emotional responses that may be as influential as rational considerations in sustainable consumption decisions (Wang & Scrimgeour, 2021). This study uses the Theory of Planned Behavior (TPB) as its main framework, but addresses a limitation: TPB typically overlooks emotions, treating them as background factors rather than direct influences on behavior (Ajzen & Schmidt, 2020). Evidence highlights the role of Anticipated Negative Emotions (ANE), such as guilt and regret, especially in moral decisions involving environmental sustainability, health, and animal welfare (Rivis et al., 2009; Escadas et al., 2019). The innovation here expands TPB by including ANE, which motivates actions to ease guilt or regret in sustainable consumption contexts (Escadas et al., 2019). Adding ANE improves predictive accuracy, increasing explained variance from 47.5% to 61% for eco-friendly purchase intentions supporting responsible consumption (Koenig-Lewis

et al., 2014). This has not been systematically tested in the context of plant-based foods within sustainable food systems, especially in Asian cultures.

Objectives

This study examines plant-based food purchase intentions in Thailand using an extended TPB framework that incorporates Anticipated Negative Emotions, comparing its explanatory power with that of the traditional model while accounting for demographic influences.

Literature Review

Sustainable Consumption and Plant-based Purchase Behavior

Sustainable consumption represents a fundamental paradigm shift in production and consumption patterns, aligned with UN SDG 12, and plant-based dietary transitions serve as critical pathways for simultaneously addressing multiple SDGs. The environmental imperative is substantial: the livestock sector contributes 11-17% of global greenhouse gas emissions, while plant-based protein production requires 47% less energy, 99% less water, and 93% less land compared to beef production, with the potential to reduce global emissions by up to 70% by 2050 (Good Food Institute Europe, 2022). Asia is projected to account for 50% of global consumption growth over the next decade (Tonby et al., 2021), rendering the region's dietary transitions pivotal for achieving global sustainability targets. Consumer research highlights a substantial level of sustainability consciousness, with 44.9% of Asia-Pacific consumers prioritizing environmentally friendly products. Emerging plant-based trends further demonstrate that consumers in the region are increasingly emphasizing preventive health measures; notably, 60% are willing to pay a premium for plant-based products that offer additional health benefits. A recent survey indicates that 58% of Asian consumers perceive plant-based products as a pathway toward a more sustainable lifestyle (Rakuten Insight, 2024; Innova Market Insights, 2024). Moreover, a cross-national survey conducted in 53 countries found that Asian consumers place greater importance on eco-friendly packaging than the global average of 22% (Fleck, 2025).

Despite positive trends in sustainable consumption, significant barriers remain. Cost remains the primary obstacle (35.7%), followed closely by a lack of information (35.2%) (Rakuten Insight, 2024). A critical discrepancy persists between consumer intentions and actual purchasing behavior, often referred to as the 'say-do gap.' While 54.6% of Asia-Pacific consumers report making sustainable choices, translating attitudes into behavior varies considerably across countries. Indonesia (68%), Thailand (62%), the Philippines (61%), and Vietnam (61%) demonstrate the highest levels of action orientation (Rakuten Insight, 2024). Among those who do not purchase sustainable goods, 15% attribute their reluctance to insufficient information or distrust, whereas 10% cite limited availability (Lightowler et al., 2022). These findings underscore that awareness alone does not consistently predict behavior.

Recent empirical studies have explicitly linked sustainable consumption with plant-based purchase behavior. Research in both Western and Asian contexts shows that environmental and health values, attitudes, and social norms significantly predict intentions to adopt plant-based foods and plant-based alternative products, positioning these behaviors as concrete expressions of sustainable consumption. However, most studies still focus on Western markets, and evidence from Southeast Asia—Particularly Thailand—Remains limited, reinforcing the need for context-specific investigations of plant-based purchase intentions within a sustainable consumption framework (Sawatraungkid, 2022; Nakhonchaigul & Siriyota, 2024). These findings suggest that while sustainability awareness and positive attitudes toward plant-based products are rising in Asia, structural barriers and the say–do gap persist, indicating that cognitive factors alone cannot fully explain behavior. This underscores the need for psychological models such as the Theory of Planned Behavior and its emotional extensions to better capture how intentions and anticipated emotions shape actual plant-based purchase decisions in Asian contexts.

The Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), developed by Ajzen (1991), is a key framework for understanding consumer behavior in the context of sustainable consumption. It posits that behavioral intention arises from three constructs: attitude toward the behavior, subjective norms, and perceived behavioral control. TPB effectively predicts plant-based food purchase intentions, essential for responsible consumption. Attitude is often the strongest predictor of purchase intentions. When consumers view plant-based foods as healthy and environmentally responsible, positive attitudes encourage stronger intentions to buy. However, this effect varies with familiarity; highly health-conscious individuals tend to rely more on their attitudes (Ricci et al., 2018; Luong et al., 2024). Subjective norms, or perceived social pressure from peers, significantly influence the adoption of plant-based diets. Family and social networks increase the likelihood of this adoption, particularly in cultures where collective decision-making is essential (Le & Nguyen, 2022). Additionally, endorsements from health professionals shape these intentions (Shin et al., 2024). Perceived behavioral control reflects how easy or difficult consumers perceive it is to adopt the behavior. Those who feel they can easily access plant-based foods are more likely to intend to purchase them. Addressing structural barriers, such as price and availability, can enhance the adoption of sustainable food (Moon, 2021; Carfora et al., 2019).

Limitations of Traditional TPB: The Emotional Gap

Although the Theory of Planned Behavior (TPB) is useful in predicting behavior, it has a key limitation when addressing moral and ethical issues in sustainable consumption, as it downplays emotional factors. In sustainable food systems, decisions often involve ethical considerations related to animal welfare, environmental protection, and health, which elicit strong emotional responses such as guilt or pride. These emotions can significantly influence behavioral intentions beyond what traditional TPB constructs measure. Research shows that including emotional variables can enhance TPB's explanatory power, with some studies reporting increases in variance from 47.5% to 61% (Koenig-Lewis et al., 2014).

Anticipated Negative Emotions: Theoretical Foundation

Anticipated Negative Emotions (ANE), derived from Anticipatory Emotion Theory (AET), influence decision-making in sustainable consumption. AET suggests that individuals forecast their feelings regarding behaviors that support sustainability, motivating them to pursue actions that elicit positive emotions while avoiding those that may lead to negative ones, like guilt or regret (Rivis et al., 2009; Escadas et al., 2019).

ANE is particularly relevant in contexts of sustainable consumption, where ethical behavior aligns with personal moral standards. For instance, individuals with positive attitudes toward plant-based foods may anticipate guilt or regret if they fail to consume them, motivating responsible choices (Lu et al., 2020). This process is driven by cognitive appraisal, as consumers consider the consequences of their food choices, such as health and environmental impacts, leading to emotional anticipations that promote sustainable behaviors (Chi et al., 2020).

Loss Aversion and Emotional Motivation in Sustainable Food Systems

Loss Aversion Theory (LAT) supports the motivational impact of avoiding losses in sustainable consumption. It suggests that the pain from losing something is felt more acutely than the pleasure from gaining it (Kahneman & Tversky, 1984). In the realm of plant-based foods, consumers may perceive not purchasing these products as a “loss” of health benefits, environmental contributions, or ethical standards. This perspective heightens negative emotions around responsible consumption decisions. For consumers who favor plant-based options or adhere to strong social norms, failing to purchase these products can feel like a tangible loss rather than just a missed opportunity. Consequently, Anticipated Negative Emotions may drive ethical consumption more powerfully than positive feelings (Escadas et al., 2019; Wang & Basso, 2019).

Integrating Emotions into TPB: The Extended Model for Sustainable Consumption

Recent research shows that the Theory of Planned Behavior (TPB) constructs directly predict intentions and influence the likelihood of experiencing Anticipated Negative Emotions (ANE) in sustainable food systems. Individuals with favorable attitudes, perceived social approval, and high behavioral control may feel greater guilt or regret for failing to act responsibly (Ibrahim et al., 2021). The extended model suggests that positive attitudes toward plant-based foods can reduce negative emotions, while stronger social expectations can heighten guilt for not conforming. Additionally, perceived behavioral control can reduce anxiety or guilt related to sustainable consumption.

Cultural Context: Asian Perspectives on Plant-based Consumption

The integration of emotional factors is crucial in Asian contexts where food choices hold significant cultural meaning related to sustainability. Traditional Asian cuisines often emphasize plant-based ingredients, but modern trends show a rise in meat consumption as economies develop (Mishra, 2025; Deng et al., 2025). This shift may create tension between traditional values and contemporary practices, influencing emotional responses to plant-based food. Research primarily from Western contexts may

overlook these cultural dynamics. In collectivistic cultures (Yang et al., 2024; Qiu, 2025), Asian consumers might experience distinct relationships between social norms and emotions, with concepts such as guilt manifesting in unique ways. This suggests that the Theory of Planned Behavior (TPB) and Anticipated Negative Emotions require cultural validation in the context of sustainable consumption. An extended framework will be tested through an empirical investigation in the Thai market.

Demographic Variables and Plant-based Food Purchase Intentions

Traditional demographic variables—Age, gender, education, and income—Have long been fundamental predictors of consumer food choices. However, their role in plant-based food adoption presents a more nuanced picture that challenges conventional demographic determinism. While earlier studies documented significant demographic influences on sustainable food choices (Pandey et al., 2021), recent research reveals a more complex pattern in which conventional socioeconomic factors show limited direct effects on purchase intentions. First, expenditure patterns—Rather than income alone—Emerge as a significant predictor, reflecting a critical distinction between “purchasing power” and “willingness to pay” (Sawatraungkid, 2022). Consumers with higher expenditure levels perceive themselves as able to absorb the cost premiums associated with plant-based alternatives, aligning with perceived behavioral control within TPB. Second, consumer typology significantly moderates intentions, with flexitarians showing lower purchase intentions than vegans and vegetarians (Luong et al., 2024). This disparity stems from flexitarians’ retention of partial meat consumption and their preference for gradual reduction over complete dietary transformation. Theoretically, this phenomenon reflects both lower perceived behavioral control—Where strict dietary changes are perceived as overly challenging—And Anticipated Negative Emotions, as flexitarians may anticipate anxiety associated with radical behavioral shifts, prompting adoption of “reduction strategies” rather than complete substitution.

The diminishing influence of traditional demographics suggests that plant-based adoption is increasingly driven by value-based motivations—Health, sustainability, and ethics—Rather than socioeconomic profiles. This shift may reflect the mainstreaming of plant-based foods across demographic segments and varying levels of market maturity. The weak explanatory power of demographics challenges traditional market segmentation approaches, suggesting that while demographic variables may function as enabling or constraining factors, they no longer function as primary drivers.

Methodology

Research Design and Approach

This study employed a quantitative, cross-sectional survey design to examine the relationships between demographic variables, Theory of Planned Behavior constructs, Anticipated Negative Emotions, and plant-based food purchase intentions within sustainable food systems. A deductive approach was adopted to test the theoretical framework developed from the literature review, using structured equation modeling principles to examine both direct and indirect relationships among constructs. The research

design was chosen for several reasons. First, quantitative methods allow for the statistical testing of theoretical relationships and the generalization of findings to the broader population interested in sustainable consumption. Second, cross-sectional data collection is appropriate for examining consumer intentions at a specific time, which aligns with TPB's focus on proximal predictors of behavior in sustainable food systems. Third, the survey approach enables systematic data collection from a large sample while maintaining standardized measurement across respondents interested in responsible consumption.

Conceptual Framework and Research Hypotheses

Based on the theoretical integration discussed in the literature review, Figure 1 presents the conceptual framework guiding this investigation. The model extends the traditional TPB by incorporating Anticipated Negative Emotions as both consequences of TPB constructs and predictors of purchase intentions in sustainable food systems.

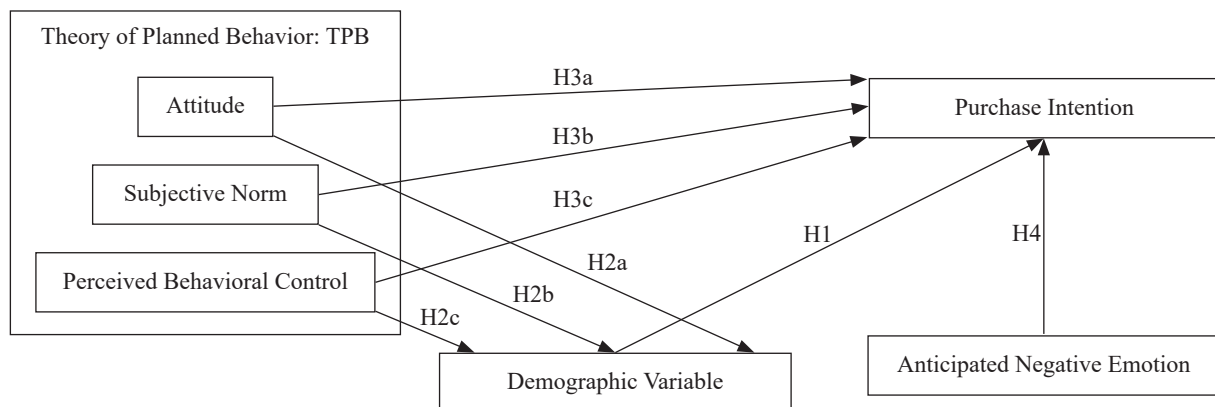


Figure 1 Conceptual Framework - Extended TPB Model

The following hypotheses were developed to test the proposed relationships in sustainable consumption contexts:

H1: Demographic variables are positively associated with purchase intention toward plant-based foods supporting sustainable food systems.

H2a: Positive attitudes toward plant-based foods are negatively associated with Anticipated Negative Emotions.

H2b: Subjective norms are positively associated with Anticipated Negative Emotions.

H2c: Perceived behavioral control is negatively associated with Anticipated Negative Emotions.

H3: Anticipated Negative Emotions positively influence purchase intention toward plant-based foods, supporting sustainable consumption.

H4: Incorporating Anticipated Negative Emotions into the TPB enhances its explanatory power for predicting purchase intentions for plant-based foods in sustainable food systems, compared to the traditional model.

H5: Demographics, TPB constructs, and Anticipated Negative Emotions together explain significant variance in purchase intention toward plant-based foods supporting responsible consumption.

Sampling Method and Size Determination

A convenience online sampling targeted early adopters of plant-based foods, mainly young, digitally engaged individuals interested in sustainability. While not fully representative, it suited this exploratory study of psychological aspects in sustainable food systems. The sample size was based on regression needs: at least 114 for six predictors, with G*Power indicating 146 for medium effects at $\alpha = 0.05$ and 0.80 power. Aiming for 400 respondents exceeded this, ensuring sufficient power. Participants were recruited through social media groups such as “Vegan Thailand” and local vegetarian communities focused on sustainable living, with clear messages outlining the study aims and voluntary participation. Data were collected from Feb 1 to Mar 15, 2025, via Microsoft Forms, shared on social media with explanations of the purpose, confidentiality, and the absence of incentives to reduce bias. The survey, estimated to take 8-10 minutes, included attention checks and response-time monitoring, excluding responses under 3 minutes, resulting in 400 valid questionnaires. Participants consented to voluntary participation and data use, with anonymity maintained and no personal information collected. They were informed they could withdraw at any time without penalty.

Scale Development and Adaptation

Measurement scales, adapted from validated TPB and consumer behavior research, were modified for plant-based food and Thai culture. Items were initially in English, then translated and back-translated into Thai to assess equivalence. The TPB constructs included: Attitude (3 items, $\alpha = 0.758$) from Chen (2022), evaluating views on plant-based foods; Subjective Norms (4 items, $\alpha = 0.779$) from Chen (2022) and refined with Suphasomboon and Vassanadumrongdee (2022), assessing social pressure; Perceived Behavioral Control (4 items, $\alpha = 0.726$) from Chen (2022), measuring ease of purchasing; Anticipated Negative Emotions (2 items, $\alpha = 0.903$) from Suphasomboon and Vassanadumrongdee (2022), measuring guilt and regret (e.g., I would feel guilty if I did not choose plant-based food options), Purchase Intention (3 items, $\alpha = 0.703$) from Chen (2022), predicting future purchase likelihood. Demographics collected included age, gender, education, income, consumer type, and monthly expenditure.

Construct Validity

Construct validity was evaluated through Exploratory Factor Analysis (EFA) using principal axis factoring to test the unidimensionality of each construct. Before extraction, we checked the sampling adequacy with the Kaiser-Meyer-Olkin (KMO) measure and Bartlett’s test of sphericity. All constructs showed acceptable to good sampling adequacy, with KMO values ranging from 0.500 to 0.761, while Bartlett’s tests were significant ($p < .001$) across the board, confirming that the correlation matrices were appropriate for factor analysis.

As shown in Table 1, the EFA results supported the unidimensional structure of all five constructs. Each construct produced a single-factor solution, with eigenvalues exceeding 1.0. Factor loadings varied from 0.537 to 0.907, with most items surpassing the recommended threshold of 0.50 (Hair et al., 2019). The construct for Attitude was measured using three items (loadings: 0.537-0.847), Subjective Norms with

four items (loadings: 0.539-0.826), Perceived Behavioral Control with four items (loadings: 0.575-0.685), Anticipated Negative Emotions with two items (loading: 0.907), and Purchase Intention with three items (loadings: 0.661-0.723). Internal consistency was confirmed with Cronbach's alpha coefficients ranging from 0.703 to 0.903, all of which exceeded the acceptable threshold of 0.70 (Nunnally & Bernstein, 1994).

To evaluate discriminant validity, the bivariate correlations among all constructs were examined. The inter-construct correlations ranged from -0.008 to 0.646, all below the threshold of 0.850 recommended by Kline (2015), indicating that the constructs were empirically distinct. Together, these findings provide solid evidence for the adequate construct validity and reliability of the measurement instrument.

Table 1 Construct Validity and Reliability Results

Construct	Items	KMO	Factor Loadings	Cronbach's α
Attitude	3	0.651	0.537-0.847	0.758
Subjective Norms	4	0.729	0.539-0.826	0.779
Perceived Behavioral Control	4	0.761	0.575-0.685	0.726
Anticipated Negative Emotions	2	0.500	0.907	0.903
Purchase Intention	3	0.687	0.661-0.723	0.703

Remarks: Extraction method: Principal Axis Factoring. All Bartlett's tests significant at $p < .001$. Inter-construct correlations ranged from -0.008 to 0.646, all below the 0.850 threshold for discriminant validity.

Results

The final sample comprised 400 Thai consumers who had previously purchased plant-based foods supporting sustainable consumption. Table 2 presents the demographic profile of respondents. The sample was predominantly female (51.2%), with males representing 33.25% and other gender identities 15.5%. This gender distribution aligns with research indicating higher female engagement in sustainable consumption behaviors. Monthly income distribution showed the largest group earning 15,000-25,000 THB (30.25%), representing middle-income consumers. Educational attainment was high, with 67.25% holding bachelor's degrees and 79.25% completing undergraduate education, indicating a well-educated sample typical of early adopters of sustainable food products. Regarding consumption behavior, the majority identified as vegetarian (57.25%), followed by flexitarian (30.25%) and vegan (12.5%). This distribution reflects the Thai context, where vegetarianism has cultural roots, but strict veganism remains less common.

Tables 2 and 3 show the results of the hypothesis testing. In H1, demographic and consumption-related variables in Model 1 accounted for 8.0% of the variance in purchase intentions ($R^2 = 0.080$, Adjusted $R^2 = 0.057$, $F = 3.398$, $p < 0.001$). Only flexitarian consumer type exhibited a significant negative association compared with vegans ($\beta = -0.189$, $p < 0.001$), while plant-based food expenditure showed a

positive association with intentions ($\beta = 0.160, p < 0.001$), whereas gender, age, income, and education were not significant predictors (all $p > 0.05$), indicating limited influence of traditional sociodemographic characteristics once consumption-related factors are considered. Regarding H2a-H2c (Table 2), the TPB constructs together explained 35.1% of the variance in ANE ($R^2 = 0.351, F = 71.252, p < 0.001$). Contrary to H2a, attitudes toward plant-based foods were positively associated with ANE ($\beta = 0.164, p < 0.001$), and in contrast to H2b, subjective norms showed a significant negative effect on ANE ($\beta = -0.161, p < 0.001$), while consistent with H2c, perceived behavioral control exhibited the strongest negative association with ANE ($\beta = -0.601, p < 0.001$). In line with H3 (Table 2, Model 3), simple linear regression indicated that ANE had a significant positive effect on purchase intentions ($\beta = 0.166, R^2 = 0.028, F = 3.368, p < 0.001$), suggesting that higher anticipated negative emotions are associated with stronger intentions to purchase plant-based foods supporting sustainable consumption. For H4 (Table 2, Model 2 and Model 2+ANE), the traditional TPB model explained 41.80% of the variance in purchase intentions ($F = 94.918, p < 0.001$). Attitude ($\beta = 0.180, p < 0.001$) and subjective norms ($\beta = 0.567, p < 0.001$) were significant positive predictors, whereas PBC was not significant ($\beta = 0.048, p = 0.233$). When ANE was added in Model 2+ANE, the explained variance increased to 44.9% ($\Delta R^2 = 0.031, F = 21.940, p < 0.001$). In this extended model, all TPB constructs and ANE became significant predictors of purchase intentions (attitude: $\beta = 0.145$; subjective norms: $\beta = 0.602$; PBC: $\beta = 0.178$; ANE: $\beta = 0.217$; all $p < 0.001$), supporting H4 and indicating that ANE provides additional explanatory power beyond the traditional TPB variables. Finally, for H5, the comprehensive model with all predictors (Table 2, Model 4) accounted for 49.9% of the variance in purchase intentions ($R^2 = 0.499, F = 27.364, p < 0.001$). Subjective norms emerged as the strongest predictor ($\beta = 0.613, p < 0.001$), followed by ANE ($\beta = 0.140, p < 0.001$), PBC ($\beta = 0.125, p < 0.001$), and attitude ($\beta = 0.114, p < 0.001$). Flexitarian consumer type showed a significant negative association with purchase intentions ($\beta = -0.166, p < 0.001$), whereas other demographic variables, including gender, age, income, education, and vegan consumer type, were not significant (all $p > 0.05$). These results partially support H5 by highlighting the dominant role of psychological variables over demographic characteristics in predicting purchase intentions.

Table 2 Standardized Beta Coefficients of Models 1 To 4

Indices	Model 1	Model 2	Model 2+ANE	Model 3	Model 4
Male	$\beta = 0.009$ $p = 0.870$	-	-	-	$\beta = -0.014$ $p = 0.722$
LGB PQ	$\beta = -0.028$ $p = 0.602$	-	-	-	$\beta = -0.010$ $p = 0.809$
Age	$\beta = 0.006$ $p = 0.908$	-	-	-	$\beta = -0.033$ $p = 0.420$
Middle Income	$\beta = -0.035$ $p = 0.570$	-	-	-	$\beta = -0.028$ $p = 0.552$

Table 2 Standardized Beta Coefficients of Models 1 To 4 (Cont.)

Indices	Model 1	Model 2	Model 2+ANE	Model 3	Model 4
High Income	$\beta = 0.035$ $p = 0.609$	-	-	-	$\beta = 0.078$ $p = 0.126$
Bachelor's Degree	$\beta = 0.087$ $p = 0.184$	-	-	-	$\beta = 0.064$ $p = 0.203$
Postgraduate Degree	$\beta = 0.061$ $p = 0.355$	-	-	-	$\beta = -0.003$ $p = 0.961$
Flexitarian Consumer	$\beta = -0.189$ $p = 0.027^*$	-	-	-	$\beta = -0.166$ $p = 0.010^*$
Vegetarian Consumer	$\beta = -0.161$ $p = 0.710$	-	-	-	$\beta = -0.106$ $p = 0.112$
Plant-based Food Expenditure	$\beta = 0.160$ $p = 0.014^*$	-	-	-	$\beta = 0.125$ $p = 0.011^*$
Attitude	-	$\beta = 0.180$ $p < 0.001^*$	$\beta = 0.145$ $p < 0.001^*$	-	$\beta = 0.114$ $p = 0.006^*$
Subjective Norm	-	$\beta = 0.567$ $p < 0.001^*$	$\beta = 0.602$ $p < 0.001^*$	-	$\beta = 0.613$ $p < 0.001^*$
Perceived Behavioral Control	-	$\beta = 0.048$ $p = 0.233^*$	$\beta = 0.178$ $p < 0.001^*$	-	$\beta = 0.125$ $p = 0.014^*$
Anticipated Negative Emotions	-	-	$\beta = 0.217$ $p < 0.001^*$	$\beta = 0.166$ $p < 0.001^*$	$\beta = 0.140$ $p = 0.005^*$
R ²	0.080	0.418	0.449	0.028	0.499
Adj. R ²	0.057	0.414	0.443	0.025	0.481

Sources: Authors' calculation

Table 3 TPB Predictors of Anticipated Negative Emotions (ANE)

Indices	β	p -value
(Constant)	-	-
Attitude	0.164	0.001
Subjective Norm	-0.161	0.001
Perceived Behavioral Control	-0.601	0.001
R ² = .351, Adjusted R ² = .345		

Sources: Authors' calculation

Discussion

The findings of this study highlight the critical role that Anticipated Negative Emotions (ANE) play in shaping consumers' purchase intentions toward plant-based foods, effectively extending the Theory of Planned Behavior (TPB). As global interest in sustainable dietary choices grows, understanding emotional influences becomes essential for fostering responsible consumption. The integration of ANE offers valuable insights into how emotions can serve as significant drivers of decision-making, particularly in ethical and sustainable food choices.

The findings from H1 indicate that behavioral and psychographic factors, such as dietary identity and prior expenditure on plant-based alternatives, are superior predictors of purchase intentions than traditional demographic variables. This shift suggests that demographics are less critical than lifestyle and consumption habits in the context of sustainable food choices (Krispenz & Bertrams, 2020). Consequently, these findings diverge from traditional studies that emphasize demographic segmentation (Pandey et al., 2021; Moon, 2021). Ultimately, marketing strategies for plant-based products should pivot from broad demographic targeting to value-based and behavioral segmentation to more accurately capture consumer intent.

The results from H4 indicate that the extended TPB model, which incorporates ANE, provides a more robust framework for predicting purchase intentions than the traditional TPB model, accounting for an additional 3.1% of variance in intentions ($\Delta R^2 = 0.031, p < 0.05$). This fits with what Koenig-Lewis and others have suggested over the years: negative emotions are motivators (Koenig-Lewis et al., 2014; Graham-Rowe et al., 2015; Lam et al., 2022). Subjective norms emerged as the strongest predictor of purchase intention, with a beta coefficient of $\beta = 0.600$ ($p < 0.001$), indicating that social approval and expectations from significant others more powerfully drive decisions to purchase plant-based products than personal attitudes or perceived behavioral control alone. When individuals perceive that important referents endorse or regularly practice plant-based consumption (Luong et al., 2024; Nakhonchaigul & Siriyota, 2024; Drolet-Labelle et al., 2023; Shin et al., 2024). Particularly in collectivist cultures such as Thailand, where community and familial opinions significantly impact individual choices, subjective norms may exert an even stronger influence on purchase intention for plant-based products.

Interestingly, our analysis revealed that positive attitudes toward plant-based foods were positively associated with Anticipated Negative Emotions, with a beta coefficient of $\beta = 0.164$ ($p < 0.05$). This counterintuitive result suggests that consumers with favorable attitudes may experience increased awareness of their ethical responsibilities, thereby heightening their sensitivity to the emotional consequences of their choices. These findings are consistent with research showing that Anticipated Negative Emotions operate as self-regulatory signals that are strengthened when people hold strong positive attitudes or moral commitments toward a behavior, making the interplay between TPB constructs and anticipated emotions inherently complex (Bohon et al., 2016; Kobbeltved & Wolff, 2009). Such dynamics are crucial for marketers and policymakers aiming to promote sustainable diets, as they indicate the potential of

emotional appeals to enhance consumer engagement and motivation. With respect to H3, Anticipated Negative Emotions were positively associated with purchase intentions, although the effect size was modest. This pattern suggests that Anticipated Negative Emotions as additional motivational forces that encourage consumers to select plant-based options beyond the influence of traditional TPB cognitions motivators (Koenig-Lewis et al., 2014; Graham-Rowe et al., 2015; Lam et al., 2022). Such a finding is consistent with prior research showing as individuals seek to avoid future emotional discomfort arising from acting in ways that conflict with their internalized values and moral standards

Moreover, the negative relationship between subjective norms and ANE ($\beta = -0.161, p < 0.05$) suggests that when social norms surrounding plant-based consumption are strong, individuals may experience reduced negative emotions regarding their dietary choices. Conversely, a lack of supportive social norms may exacerbate feelings of guilt or regret, deterring individuals from pursuing plant-based options (Onwezen et al., 2013; Krettenauer & Lefebvre, 2021; Barbeta-Viñas, 2023). This highlights the importance of cultivating a cultural environment that supports sustainable food choices, fosters positive emotional reinforcement and encourages broader dietary shifts.

Ultimately, the empirical evidence confirms H5 within this framework, subjective norms exert the most potent influence, followed sequentially by ANE, perceived behavioral control, attitude, and flexitarian dietary identity. Conversely, traditional sociodemographic factors are not statistically significant. This hierarchy is consistent with prior research on sustainable food choices and alternative proteins, which has repeatedly shown that in collectivist cultural settings (Le & Nguyen, 2022; Yang et al., 2024; Luong et al., 2024), subjective norms often constitute the primary driver of intention, reflecting the centrality of social approval and perceived expectations of significant others. Furthermore, the additional predictive contribution of Anticipated Negative Emotions supports the view that extending the TPB with affective components enhances its explanatory power, as anticipated feelings of guilt, regret, or self-blame provide an emotional motivational layer beyond the traditional cognitive determinants of behavior (Koenig-Lewis et al., 2014; Ibrahim et al., 2021).

Conclusions

This study extends the Theory of Planned Behavior (TPB) by integrating Anticipated Negative Emotions (ANE) to enhance the understanding of consumers' purchase intentions for plant-based foods. Our findings reveal that Anticipated Negative Emotions, particularly guilt and regret, play a significant role in shaping consumer behavior alongside traditional TPB constructs. With the extended model accounting for 44.9% of the variance in purchase intention compared to 41.8% for the traditional model, we provide empirical support for the inclusion of emotional dimensions in predicting sustainable consumption behaviors.

The analysis highlighted subjective norms as the most substantial predictor of purchase intentions, underscoring the importance of social influence in guiding consumer choices toward plant-based diets.

Furthermore, it was noteworthy that positive attitudes were positively associated with Anticipated Negative Emotions, suggesting a complex interplay between feelings and decision-making processes. Conversely, the negative correlations among subjective norms, perceived behavioral control, and ANE warrant further exploration, indicating that certain social pressures could potentially induce negative emotional responses that deter sustainable consumption.

Recommendations

Given the implications of this research, we recommend several avenues for future studies. First, longitudinal research is essential to examine how Anticipated Negative Emotions and other psychological factors evolve over time among consumers transitioning to plant-based diets. By tracking these trends, researchers can better understand the dynamics of consumer behavior and the stages of adopting sustainable consumption practices.

Second, qualitative studies could provide richer insights into the emotional landscape surrounding plant-based food choices. Focus groups or in-depth interviews may reveal the underlying motivations and anxieties that shape consumer behavior, particularly in non-Western contexts where cultural perceptions of food and sustainability may differ markedly.

Third, targeted marketing strategies should leverage the insights gained from this study. Marketers promoting plant-based foods should consider integrating emotionally resonant messaging that addresses potential guilt or regret associated with traditional diets. Campaigns that emphasize positive outcomes, personal health benefits, and community support can create a more conducive environment for adopting plant-based diets.

Additionally, public policy interventions could benefit from this research. Policymakers should consider initiatives that not only promote plant-based foods but also address the psychological barriers consumers face. Educational programs that illuminate the emotional and ethical dimensions of food choices could foster greater consumer awareness and acceptance of sustainable diets.

Lastly, given the increasing globalization of food systems, further research should examine the contextual factors shaping plant-based food consumption across diverse cultures, particularly in Asian markets, where plant-based eating is historically entrenched. Understanding these factors will help bridge the existing knowledge gap and contribute to the development of region-specific strategies that promote sustainable food systems globally.

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