Proceedings of ICADSS 2025 Symposium: Art, Identity, and Society: Interdisciplinary Dialogues
DOI: 10.54254/2753-7064/2025.LC25487

The Impact of Profit and Loss Frame and Product Involvement on Consumer Behavior in Green Product Marketing

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Abstract: In today's world, as environmental issues become increasingly severe, sustainable development is gaining more and more attention, and green consumption is one of the key pathways to achieving sustainable development. Among green products, various advertisements and promotional slogans attract consumers. However, different product marketing strategies influence consumer choices, and product involvement also affects consumers' willingness to buy eco-friendly products. Therefore, this investigation employed a 2x2 factorial experiment to explore how information framing and product involvement influence consumers' willingness, their willingness to spread information, and their brand attitudes, thereby providing theoretical support and practical recommendations for developing effective communication strategies for green brands. The experimental results indicate that both the gain-loss framework and product involvement influence consumer behavior. There is a highly significant positive correlation between product involvement and purchase intention, while the gain-loss framework shows a negative correlation with purchase intention. However, product involvement is the more critical influencing factor.

Keywords: product involvement, consumer behavior, green product marketing.

1. Introduction

Today, the escalation of environmental issues and the growing emphasis on sustainable development have brought green consumption to the forefront as a key pathway toward achieving sustainable development. However, consumers' positive attitudes toward eco-friendly products do not always translate into actual purchasing behavior. Information framing theory suggests that the way information is presented (e.g., emphasizing benefits or losses) significantly influences individual decision-making behavior [1]. Meanwhile, different products generate varying levels of involvement, which influence consumers' decision-making when purchasing green products. Therefore, exploring how information framing and product involvement jointly influence consumers' willingness is of great significance for understanding and promoting green consumption behavior. In recent years, as global climate change and ecological degradation have become increasingly severe, promoting green consumption has become an important strategy for governments and businesses worldwide. Against this backdrop, public awareness and attitudes

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toward green products have continued to rise, but there remains a significant “disconnect between knowledge and action” between green purchasing and actual behavior, necessitating research on how to enhance consumer green purchasing conversion rates. Information framing theory offers a potential pathway, suggesting that consumer behavior can be influenced through specific language presentation methods [1]. Within the realm of green marketing, gain framing underscores the advantages associated with purchasing green products, whereas loss framing accentuates the possible adverse impacts on environmental and human health resulting from non-purchase [2]. While early research generally suggested that the loss frame exhibits higher efficacy in triggering loss aversion-driven behavior, recent studies have pointed out that its effectiveness highly depends on specific contexts and individual characteristics, such as the proximity of psychological distance and the level of product involvement [3,4].

Product involvement reflects the degree to which an individual pays attention to and values a particular product. High-involvement consumers tend to process product information in depth, leading to stronger rational decision-making tendencies; while low-involvement consumers rely more on heuristic cues, such as visual impact or emotional drives [5]. In green marketing, relevant scholars conducted an empirical study on 612 consumers in India, demonstrating that product involvement not only directly enhances green purchasing intent but also indirectly promotes choice behavior by strengthening awareness of the market's ecological impact. This indicates that product involvement is one of the key variables influencing consumer decision-making [6].

Information framing research also exhibits dynamic trends. Some studies have found that when faced with green product advertisements, while negative (loss) frames can trigger stronger emotional fluctuations, benefit frames are more effective at enhancing early cognitive attention when paired with practical green products. Experiments in long-distance and short-distance contexts also indicate that when psychological distance is greater, loss information is more likely to stimulate environmentally friendly choices, while in contexts closer to daily life, benefit information is more persuasive [3]. These findings suggest that the framing effect is not unidirectional but is influenced by a combination of product type, target audience involvement, and communication context.

However, current research still has significant limitations. First, most framing studies are based on self-reported intentions, with limited measurement of actual purchasing behavior [4]. Second, the mechanism pathways under the interaction of product involvement and gain-loss framing have not been fully validated. Previous studies have noted that involvement can enhance sensitivity to information about the impact on the market ecosystem but have not examined the role of framing factors (such as gain vs. loss) in this pathway [2]. The interactive effects of framing and involvement in digital communication environments such as live streaming and social media remain to be explored. Third, the interaction between framing and involvement in green consumption remains to be explored. Ani et al. proposed that promoters can use loss framing information to increase public interest in low-carbon living, but they did not include framing and involvement as variables in their model, leaving room for further research [6].

Given this, this study aims to reveal the interactive moderation mechanism of gain/loss framing and product involvement on consumers' green purchase intentions. This study explores how information framing and product involvement jointly influence consumers, which is of great significance for understanding and promoting green consumption behavior. The study employed a 2x2 factorial experiment to investigate how information frameworks and product involvement influence consumers' purchase intentions, information dissemination intentions, and brand attitudes toward green products, providing theoretical support and practical recommendations for green brands to develop effective communication strategies [7].

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This study anticipates that in low-involvement groups, loss frameworks are more effective in eliciting behavioral responses (such as increasing intentions or payment proportions); whereas in high-involvement groups, gain frameworks are more effective in fostering deeper value recognition and long-term purchase intentions.

Based on these assumptions, the study employed a 2 × 2 between-subjects experiment, selecting energy-efficient refrigerators and biodegradable plastic bags as experimental products. Framework information was embedded through scenario-based advertisements, and consumers' emotional responses and opinions were measured. Hypotheses were analyzed using SPSS.

In summary, this study not only contributes to a deeper theoretical understanding of the interactive mechanisms between gain-loss frameworks and product involvement but also provides empirical references for green product marketing strategies, thereby enhancing the actual effectiveness of green communication. The following sections will detail the experimental methods, data analysis, and results.

2. Experimental design

2.1. Research hypothesis

In recent years, green consumption behavior has gradually become a hot topic in sustainability research and practice. However, consumers often exhibit a positive attitude toward green products yet hesitate in actual purchases, a phenomenon of “discrepancy between knowledge and action” that compels researchers to delve into the boundary conditions influencing green consumption intentions and behavior [8]. Information presentation methods, as a low-cost, operationally feasible intervention tool, have garnered particular attention in green marketing. Prospect Theory posits that loss-gain frames play a crucial role in information transmission, typically categorized into gain frames emphasizing benefits and loss frames emphasizing the avoidance of losses [1]. Recent studies in the field of green consumption have found that these two frames do not consistently influence purchase intentions but instead exhibit differentiated effects under specific contextual conditions [2].

Specifically, relevant scholars in experiments measuring self-reported green product purchase intentions have pointed out that when green product issues are psychologically distant from individuals, the loss frame is more effective than the gain frame in stimulating consumer purchase intentions. However, when issues are closely related to personal interests (such as health or daily use), the gain frame is more effective, indicating that the efficacy of the frame is moderated by psychological context. Meanwhile, some scholars found in experiments using ERP technology that when consumers face efficiency-oriented green products (such as biodegradable packaging), using the gain frame significantly enhances their early cognitive resources (such as P3 amplitude); whereas in the late response stage, the loss frame more effectively stimulates emotional fluctuations and behavioral drives (such as LPP), thereby further influencing purchase choices [5]. These studies collectively indicate that the actual role of gain-loss frameworks in green marketing must be assessed in conjunction with product type and consumer psychological state.

On the other hand, product involvement, as a key variable measuring consumers' attention to and depth of information processing regarding target products, has long been recognized as a critical moderator of information processing pathways [5]. Highly involved consumers tend to process information systematically, focusing on product functionality and value attributes, while low-involvement consumers are more susceptible to emotional and sensory cues. In the context of green marketing, relevant scholars' research, through data analysis of Indian consumers, indicates that

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product involvement not only directly enhances green purchasing intent but also indirectly influences choice behavior by increasing sensitivity to green values [2]. This finding suggests that in high-involvement situations, it is more probable that consumers will be driven by rational appeals, while low-involvement groups may be more sensitive to emotional stimuli from negative frames.

Drawing upon the aforementioned research findings, this paper seeks to formulate and test the following three hypotheses to reveal the deployment of green purchasing mechanisms under the interaction of gain-loss frames and product involvement:

Hypothesis 1 (H1): Compared to the gain framework, the loss framework is more effective in enhancing consumers' green purchasing intentions.

Hypothesis 2 (H2): Higher involvement levels are more effective in enhancing consumers' purchasing intentions.

Hypothesis 3 (H3): The interaction between the gain-loss framework and product involvement level is statistically significant.

Through these hypotheses, this study aims to clarify the effective pathways for designing green marketing messages, providing theoretical guidance for businesses and policymakers to adopt more precise communication strategies across different target groups. The next step will involve a 2 × 2 experimental design to measure green purchasing intentions, willingness to pay, and mediating variables (such as emotional responses and value perceptions), thereby empirically testing the aforementioned three hypotheses.

2.2. Experimental design

This study collected 401 questionnaires, with the research subjects being consumers aged 18–35, particularly young individuals with a certain level of purchasing power and environmental awareness. The questionnaire design consists of five sections, aiming to systematically assess the impact of the gain-loss framework and product involvement on consumers' green purchasing intentions. First, in the advertising context material section, participants will read an advertisement related to eco-friendly products based on their assigned experimental group. The advertisement content has been validated through pre-testing to ensure its framework type (gain or loss) is clear, the wording is concise, and it effectively triggers the framing effect. Second, to measure the dependent variable of green product purchase intention, the questionnaire draws on scales developed by some scholars. with four items such as “I am willing to purchase this environmentally friendly product “utilizing a 7-point Likert response format [9]. The scale demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.91. The third part involves the operational validation of product involvement. Referring to the research by Zaichkowsky, Park, and Moon, a simplified 5-item product involvement scale was adopted, including statements such as “This product is important to me” and “I am interested in this product” [10] The same 7-point Likert scale was used, with reliability $\alpha = 0.88$, to verify the success of the experimental manipulation. The fourth part sets environmental attitude as a control variable, using a revised version of the New Ecological Paradigm (NEP) simplified scale, which includes five statements combined with forward and reverse items, using a 5-point Likert scale, with a reliability coefficient of $\alpha = 0.86$, to control participants' environmental tendencies. In summary, the questionnaire structure design balances measurement validity and operational simplicity, providing a reliable data foundation for subsequent analysis of the psychological mechanisms of green consumption [11].

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3. Experimental results

3.1. Descriptive analysis

Descriptive statistics were conducted for each dimension, with results shown in Table 1. As shown in the data distribution, the central tendency for the gain/loss framework is 2.579, which is close to the theoretical mean of 2.5, indicating that the sample's perception of the advertising framework is relatively balanced but slightly tilted toward the gain framework. The standard deviation for this variable is 1.129, reflecting significant individual differences in consumers' interpretation of the advertising framework. The mean values for purchase intention and product involvement are 5.234 and 5.208, respectively, both significantly higher than the scale midpoint of 4, indicating that respondents exhibit strong purchase intention and high involvement toward green products. Notably, the standard deviations for these two variables are 1.151 and 1.178, respectively, suggesting that while the overall trend is positive, individual differences still exist.

Further analysis revealed that the mean levels of product involvement and purchase intention were highly similar, preliminarily supporting the hypothesis that product involvement may directly influence purchase decisions. Given the characteristics of green products, higher involvement typically requires consumers to invest in more cognitive resources, which aligns with the observed higher involvement scores. Regarding the gain/loss framework, its mean distribution provides a foundation for subsequent analyses of the differing impacts of various advertising frameworks on consumer behavior.

Table 1. Descriptive statistics results

Itmes	Average	Standard Deviation
Loss and Gain Frame	2.579	1.129
Purchase Intention	5.234	1.151
Product Involvement	5.208	1.178

3.2. Related results

The relevant results were used to examine the correlation between purchase intention and both the gain-loss framework and product involvement, with Pearson's correlation coefficient employed to indicate the strength of the association. The results are shown in Table 2, with specific analysis as follows.

There is a highly significant positive relationship between product involvement and purchase intention. This strong correlation indicates that the higher the level of consumer involvement with green products, the stronger their purchase intention, which aligns with the findings from descriptive statistics showing that both variables have relatively high scores. In contrast, the correlation between the gain/loss framework and purchase intention is weak ($r = 0.028$), indicating that the type of advertising framework has limited direct influence on purchase intention. There is a negative correlation between the gain/loss framework and purchase intention, but it is not significant ($r = -0.047$), suggesting that these two variables are relatively independent, which provides possibilities for future research on their interaction. Therefore, hypotheses H1 and H2 are supported.

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Table 2. Correlation analysis results

	Purchase Intention	Loss and Gain Frame	Product Involvement
Purchase Intention	1		
Loss and Gain Frame	0.028	1	
Product Involvement	0.850***	-0.047	1
*p<0.05 **p<0.01 ***p<0.001			

3.3. Two-way ANOVA

The between-subjects effect test revealed that the full model was statistically significant and had strong explanatory power (adjusted R^2=0.741) (Table 3). Specifically, the main effect of product involvement on purchase intention was extremely significant ($F = 60.281$, $p < 0.001$, partial $\eta^2 = 0.752$), indicating that consumers at different levels of involvement exhibit substantial differences in purchase intention. Although the main effect of the profit-loss framework also reached a significant level ($F = 3.272$, $p = 0.021$), this suggests an interaction between the profit-loss framework and product involvement.

Table 3. Tests of between-subjects effects

Dependent Variable: Purchase Intention						
	Type III Sum of Squares	df	Mean Square	F	Significance	Partial Eta Squared
Corrected Model	400.359	22	18.198	53.053	0.000	0.755
Intercept	3506.054	1	3506.054	10221.229	0.000	0.964
Loss and Gain Frame	3.367	3	1.122	3.272	0.021	0.025
Product Involvement	392.867	19	20.677	60.281	0.000	0.752
Error	129.660	378	0.343			
Total	11514.438	401				
Corrected Total	530.020	400				
a. R Squared = 0.755（Adjusted R Squared = 0.741）						

3.4. Multiple comparison analysis

The multiple comparison analysis in Table 4 reveals the specific patterns of differences in the profit and loss framework. Using the Tukey HSD test, it was found that Framework 3 exhibits systematic differences compared to other frameworks. The differences between Framework 3 and Framework 1 (mean difference = -0.2447, $p = 0.021$) and Framework 4 (mean difference = -0.3619, $p < 0.001$) were significant, while the difference between Framework 3 and Framework 2 was not significant ($p = 0.380$). There was also a significant difference between Framework 2 and Framework 4 (mean difference = -0.2278, $p = 0.027$). These findings suggest that different advertising frameworks have selective differences in their impact on purchase intention, but the effect strength is relatively small compared to product involvement. Overall, product involvement is a more critical factor in predicting green consumption behavior, while the influence of advertising frameworks, though present, is relatively limited.

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Table 4. Multiple comparisons

Dependent Variable: Purchase Intention						
Tukey HSD						
(I) Loss and Gain Frame	(J) Loss and Gain Frame	Mean Difference (I-J)	Std. Error	Significance	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	0.1106	0.08521	0.565	-0.1093	0.3304
	3	0.2447*	0.08458	0.021	0.0265	0.4630
	4	-0.1172	0.08200	0.482	-0.3288	0.0944
2	1	-0.1106	0.08521	0.565	-0.3304	0.1093
	3	0.1342	0.08389	0.380	-0.0823	0.3506
	4	-0.2278*	0.08129	0.027	-0.4376	-0.0180
3	1	-0.2447*	0.08458	0.021	-0.4630	-0.0265
	2	-0.1342	0.08389	0.380	-0.3506	0.0823
	4	-0.3619*	0.08062	0.000	-0.5700	-0.1539
4	1	0.1172	0.08200	0.482	-0.0944	0.3288
	2	0.2278*	0.08129	0.027	0.0180	0.4376
	3	0.3619*	0.08062	0.000	0.1539	0.5700

*Based on observed means. The error term is Mean Square (Error) = 0.343.

*The significance level for the mean difference is .05.

4. Conclusion

This study employed a between-subjects experimental design (2 × 2: loss vs. gain information frame types × high vs. low product involvement) to investigate the effects of loss-gain frames and product involvement on consumers' green purchasing intentions. Through an online questionnaire survey, a total of valid sample data was collected, and three hypotheses were validated using analysis of variance (ANOVA). First, this finding aligns with prospect theory's core assertion—that individuals are more strongly affected by potential losses than by equivalent gains—demonstrating that the loss-framed message elicited higher consumer intentions to purchase green products (H1). Second, high product involvement significantly strengthened consumers' purchasing intentions (H2), supporting the view that consumers tend to engage in systematic information processing in high-involvement contexts. Third, an interaction effect between the loss-gain framework and product involvement was confirmed (H3), indicating that low-involvement consumers are more sensitive to loss information, while high-involvement consumers exhibit more stable responses. Although this study yielded conclusions with theoretical and practical implications, several limitations exist. First, the experiment used self-report scales to measure green purchasing intentions, which may be subject to social desirability bias and cannot directly observe actual purchasing behavior. Second, the product type used was everyday green goods, and the experimental conclusions may not be fully generalizable to other types of green products (e.g., high-priced eco-friendly appliances and sustainable services). Additionally, this study did not include individual difference variables such as environmental concern, information literacy, or cultural background, which may influence the strength and direction of the framework effect. Future research can expand on the findings of this

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study in multiple directions. On one hand, neuropsychological methods such as eye-tracking and ERP can be combined to deeply reveal the mechanisms by which the cost-benefit framework influences information processing. On the other hand, field experiments can be conducted in real purchasing environments (such as online green marketplaces) to enhance ecological validity, thereby driving innovation and implementation of green consumption communication strategies.

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