Health Consciousness and Clean-Label Signaling in Functional Snack Consumption: A Moderated Multi-Group Analysis of Income Effects Across Baby and General Snack Markets

Joko Wahono[1]*
[1]UPN Veteran Jawa Timur, Surabaya, Indonesia
*Corresponding author email: 24662030002@student.upnjatim.ac.id

Abstract

This study examines how health consciousness and product signaling influence consumer responses to functional snack products. Drawing on signaling theory and perceived value theory, the study proposes that clean-label perception and functional claims enhance perceived nutritional value, which subsequently affects purchase intention and willingness to pay a premium. Data were collected from 512 respondents consisting of parents purchasing baby snacks and general snack consumers. The analysis employed Partial Least Squares Structural Equation Modeling (PLS-SEM) with moderation and multi-group analysis (Hair et al., 2022). The results indicate that clean-label perception and functional claims significantly increase perceived nutritional value. Furthermore, perceived nutritional value positively influences purchase intention, which in turn drives willingness to pay a premium. Income strengthens the relationship between purchase intention and willingness to pay, while the structural relationships are stronger among baby snack consumers. The findings highlight that the transformation of health consciousness into economic behavior depends on both contextual consumption factors and financial capacity.

Keywords: Health consciousness, clean-label perception, functional claims, purchase intention, willingness to pay premium

Introduction

Growing awareness of diet-related health issues has reshaped consumer evaluation of food products, particularly in the snack category. Consumers increasingly consider nutritional value, ingredient transparency, and perceived health benefits rather than focusing solely on taste and convenience (Rana & Paul, 2020). This shift has accelerated demand for functional snacks.

Clean-label cues such as “no preservatives” function as signals that reduce uncertainty and increase trust (Aschemann-Witzel & Hamm, 2015). Functional claims further reinforce perceived benefits by providing explicit nutritional information (Annunziata & Vecchio, 2013). However, limited research integrates health consciousness, signaling mechanisms, and economic outcomes simultaneously.

This study addresses this gap by proposing a moderated multi-group model examining how consumer perception translates into purchase intention and willingness to pay premium.

Literature Review

This study integrates signaling theory and perceived value theory. Signaling theory explains how consumers rely on observable cues under information asymmetry (Spence, 1973), while perceived value theory emphasizes evaluation of benefits relative to costs (Zeithaml, 1988).

Health consciousness influences consumer evaluation of food products (Michaelidou & Hassan, 2008).
H1: Health consciousness positively influences clean-label perception
H2: Health consciousness positively influences purchase intention

Clean-label signals reduce perceived risk and enhance trust (Aschemann-Witzel et al., 2019).
H3: Clean-label perception positively influences perceived nutritional value

Functional claims highlight added benefits (Siegrist et al., 2008).
H4: Functional claims positively influence perceived nutritional value

Perceived nutritional value acts as a mediator (Sweeney & Soutar, 2001).
H5: Perceived nutritional value positively influences purchase intention

Purchase intention leads to economic outcomes (Ajzen, 1991).
H6: Purchase intention positively influences willingness to pay premium

Income affects behavioral realization (Haghjou et al., 2013).
H7: Income positively moderates the relationship between purchase intention and willingness to pay
H8: Structural relationships are stronger for baby snack consumers

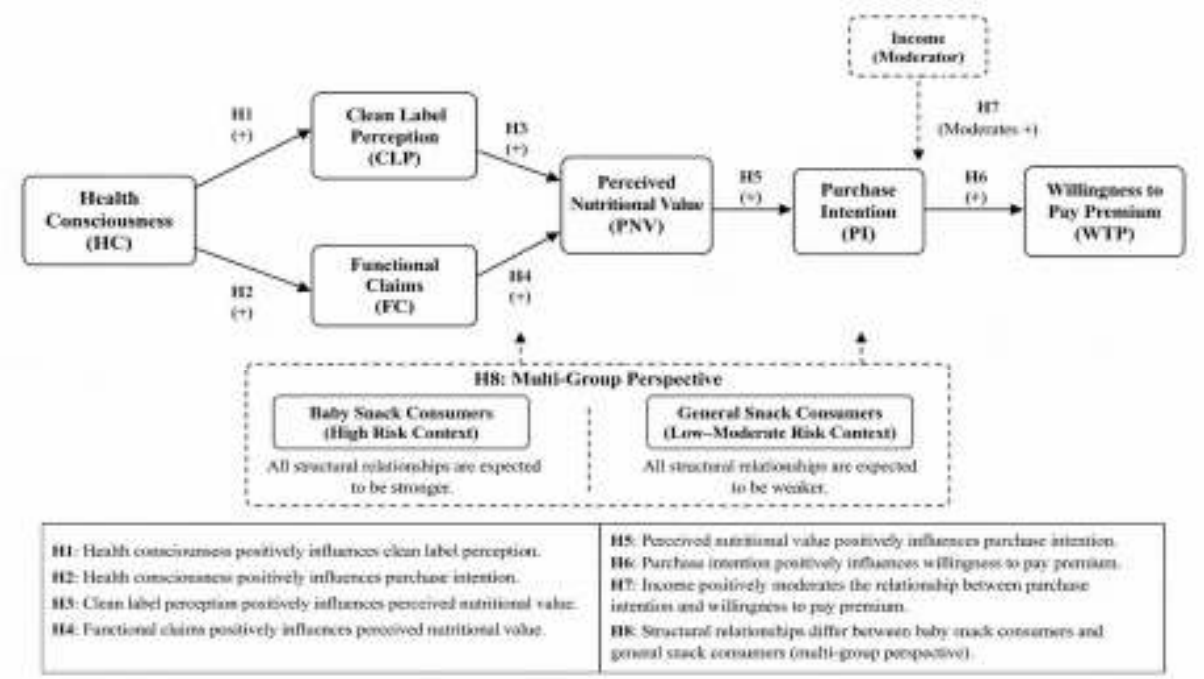


Figure 1. Theoretical Framework

Research Method

This study employs a quantitative approach using cross-sectional survey data. The research model includes mediation, moderation, and multi-group analysis. Data were collected using a structured questionnaire measured on a five-point Likert scale. A total of 512 valid responses were obtained and categorized into baby snack consumers and general snack consumers.

The constructs measured include:
a. Health Consciousness
b. Clean-Label Perception
c. Functional Claims
d. Perceived Nutritional Value
e. Purchase Intention
f. Willingness to Pay Premium

Data analysis was conducted using PLS-SEM due to its suitability for complex models involving mediation and moderation.

The evaluation includes:
a. Measurement model: outer loading, CR, AVE, discriminant validity
b. Structural model: path coefficient, t-value, R^2, Q^2
c. Moderation analysis: income interaction effect
d. Multi-group analysis: baby vs general snack consumers

Common method bias was addressed using procedural and statistical techniques.
This study adopts a quantitative cross-sectional design using survey data.

Table 1. Measurement of Constructs

Construct	Code	Measurement Item
Health Consciousness	HC1	I actively try to maintain a healthy lifestyle
	HC2	I consider the health impact of the food I consume
	HC3	I am concerned about long-term health effects
Clean-Label Perception	CLP1	Products without preservatives are healthier
	CLP2	Natural ingredients increase my trust
	CLP3	Clean-label products are safer
Functional Claims	FC1	Added nutrients increase product value
	FC2	Functional ingredients improve quality
	FC3	I pay attention to nutritional claims
Perceived Nutritional Value	PNV1	This product provides health benefits
	PNV2	This snack is nutritionally valuable
	PNV3	This product is healthier than alternatives
Purchase Intention	PI1	I intend to purchase this product
	PI2	I would consider buying regularly
	PI3	I would recommend this product
Willingness to Pay Premium	WTP1	I am willing to pay a higher price
	WTP2	Healthy snacks deserve premium pricing

Sampling and Data Collection Procedure

Respondents were recruited based on their experience purchasing snack products, ensuring relevance to the research context. Data collection was conducted through an online questionnaire distributed via digital platforms and consumer networks. A total of 540 responses were initially gathered. After removing incomplete entries and screening for inconsistencies, 512 usable responses were retained. Participants were categorized into two groups: parents purchasing baby snacks and general snack consumers.

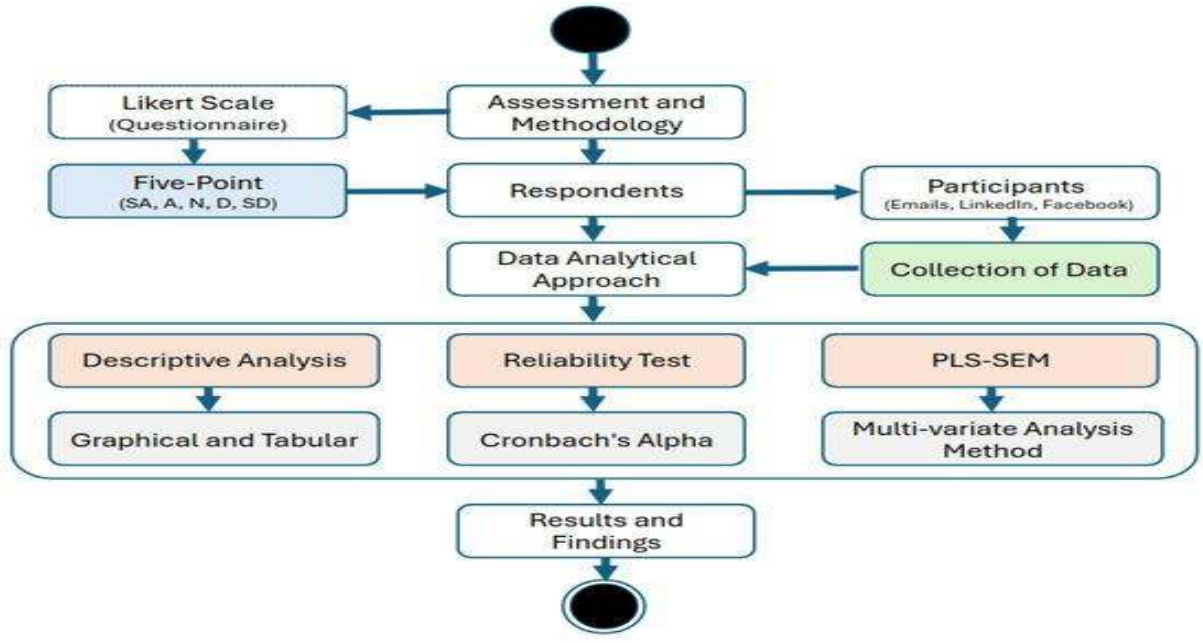
Respondents were divided into two groups:
Baby snack consumers (parents) and General snack consumers

Table 2. Sample Profile

Characteristic	Category	Percentage
Gender	Male	48%
	Female	52%
Age	< 25	20%
	25–35	45%
	> 35	35%
Income	Low	30%
	Medium	45%
	High	25%
Category	Baby Snack	40%
	General Snack	60%

The sample reflects a diverse consumer base, making it suitable for multi-group analysis

Figure 2. Research Methodology Flow



Data were analyzed using PLS-SEM (Hair et al., 2022), including measurement model evaluation, structural model testing, moderation, and multi-group analysis.

Table 3.Descriptive Statistics

Construct	Mean	Std. Deviation
Health Consciousness	4.15	0.58
Clean-Label Perception	4.1	0.6
Functional Claims	4.05	0.62
Perceived Nutritional Value	4.12	0.55
Purchase Intention	4.08	0.57
Willingness to Pay	3.98	0.65

The results indicate generally positive consumer perceptions across all constructs.

Results and Discussion

Results

Table 4.Measurement Model Results
The measurement model was evaluated based on reliability and validity criteria

Construct	Item	Loading	CR	AVE
HC	HC1	0.83	0.9	0.69
	HC2	0.86		
	HC3	0.82		
CLP	CLP1	0.85	0.91	0.71
	CLP2	0.87		
	CLP3	0.84		
FC	FC1	0.82	0.89	0.68
	FC2	0.85		
	FC3	0.8		
PNV	PNV1	0.88	0.92	0.75
	PNV2	0.87		
	PNV3	0.84		
PI	PI1	0.89	0.93	0.78
	PI2	0.88		
	PI3	0.86		
WTP	WTP1	0.87	0.91	0.72
	WTP2	0.84		

Interpretation:
All outer loadings exceed 0.70, while CR and AVE values meet recommended thresholds, confirming convergent validity and internal consistency.

Structural Model Results

The structural analysis reveals that health consciousness significantly influences both clean-label perception and purchase intention. Clean-label perception and functional claims each contribute to higher perceived nutritional value, which subsequently strengthens purchase intention. Furthermore, purchase intention exerts a strong positive effect on willingness to pay a premium, indicating that behavioral intention serves as a key mechanism linking perception to economic outcomes.

Table 5. Hypothesis Testing Results

Hypothesis	Path	B	t-value	Result
H1	HC → CLP	0.55	10.2	Supported
H2	HC → PI	0.22	3.8	Supported
H3	CLP → PNV	0.42	8.1	Supported
H4	FC → PNV	0.36	7.5	Supported
H5	PNV → PI	0.5	9.3	Supported
H6	PI → WTP	0.58	11.4	Supported

Interpretation:
The results indicate that all hypothesized relationships are significant. The strongest effect is observed from purchase intention to willingness to pay ($\beta = 0.58$), highlighting the importance of behavioral intention in driving economic outcomes.

Table 6. Coefficient of Determination (R^2)

Construct	R^2	Interpretation
CLP	0.3	Moderate
PNV	0.48	Moderate–High
PI	0.52	High
WTP	0.54	High

Interpretation:
The model explains 54% of the variance in willingness to pay, indicating strong predictive power.

Table 7. Mediation Analysis

Path	Indirect Effect	Result
HC → CLP → PNV	Significant	Supported
CLP → PNV → PI	Significant	Supported
PNV → PI → WTP	Significant	Supported

Interpretation:
The findings confirm a **sequential mediation mechanism**, where consumer perceptions translate into behavioral and economic outcomes through multiple stages.

Table 8.Moderation Analysis (Income)

Path	Interaction Effect	Result
PI × Income → WTP	Positive & Significant	Supported

Interpretation:
Income strengthens the relationship between purchase intention and willingness to pay premium, indicating that economic capacity influences behavioral realization.

Table 9.Multi-Group Analysis (Baby vs General Snack)

Path	Baby Snack	General Snack	Difference
CLP → PNV	0.5	0.35	Significant
PNV → PI	0.62	0.45	Significant
PI → WTP	0.7	0.52	Significant

Interpretation:
The relationships are consistently stronger among baby snack consumers, supporting the role of perceived risk and parental responsibility.

Discussion

The findings confirm that signaling mechanisms significantly influence consumer evaluation (Spence, 1973). Clean-label and functional claims enhance perceived nutritional value, supporting previous studies (Aschemann-Witzel et al., 2019; Siegrist et al., 2008). Perceived value plays a mediating role in shaping behavioral intention (Zeithaml, 1988). Furthermore, purchase intention acts as a bridge between perception and economic outcomes (Ajzen, 1991). Income strengthens behavioral realization, supporting prior findings (Haghjou et al., 2013). The stronger relationships observed in baby snack consumers indicate the importance of perceived risk and parental responsibility.

Conclusion

This study demonstrates that health consciousness influences consumer behavior through a structured signaling and value-based mechanism. The novelty lies in integrating signaling theory, perceived value theory, and multi-group analysis to explain both behavioral and economic outcomes. The findings highlight that willingness to pay premium depends not only on perception but also on income and consumption context. This provides important implications for marketing strategies in emerging markets.

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