



JIMT:
Jurnal Ilmu Manajemen Terapan

E-ISSN: 2686-4924
P-ISSN: 2686-5246

<https://dinastirev.org/JIMT> dinasti.info@gmail.com [+62 811 7404 455](tel:+628117404455)

DOI: <https://doi.org/10.38035/jimt.v7i4>
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The Influence of Packing Design and Product Innovation on Customer Purchase Decisions, the Intervening Role of Marketing Strategy

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Abstract: Background: Taiwan is famous for its rich tea culture, but tea producers in Yunlin County face a challenge in attracting the younger generation, especially students who have modern tastes. While attractive Packaging Design and creative Product Innovation are important to grab attention, these factors often need a strong Marketing Strategy to actually convince university students to buy the product. This research aims to explore how marketing serves as a bridge (intervening role) between design and innovation to successfully influence the Purchase Decisions of students. Objective: This study aims to examine the influence of packaging design and product innovation on consumer purchase decisions for tea (茶 / Chá), with marketing strategy as an intervening variable. Methods: This quantitative study uses surveys to collect data from university students. Using SPSS, it analyzes how Packaging Design and Product Innovation (independent variables) influence Purchase Decisions (dependent variable), with Marketing Strategy serving as the intervening variable sample: The participants are university students selected through purposive sampling. This study focuses on active students who have experience with or an interest in tea consumption to understand their buying behavior. Key Findings: The findings show that Packaging Design and Product Innovation significantly boost Purchase Decisions. Specifically, Marketing Strategy acts as a key bridge, making the design and innovation much more effective in convincing university students to buy the tea products. Conclusion & Implications: Marketing Strategy is essential to turn great design and innovation into actual sales. The study implies that tea businesses must move beyond tradition and use modern marketing to reach university students. Practically, companies should focus on digital branding and creative packaging to effectively influence the younger generation's Purchase Decisions.

Keyword: Packaging Design, Product Innovation, Marketing Strategy, Purchase Decision, Tea (茶)

INTRODUCTION

Tea (Chá) is a major global trend, and in Taiwan, it is a deeply rooted cultural identity. However, with many brands in the market, packaging design is now essential to make a product stand out (differentiation). Furthermore, product innovation is needed to increase the product's value and keep up with modern tastes. While design and innovation are important, there is often a "gap" where good products fail to sell because they lack a strong marketing strategy to reach the consumer. This study focuses on the tea industry in Yunlin because it represents a mix of tradition and modern competition. By using marketing strategy as a bridge, this research aims to show how these factors together influence the purchase decisions of university students.

Taiwan is well known for its strong tea culture, and the tea market continues to grow every year. In 2021, the Taiwan tea market reached about USD 244.154 million, and it is expected to increase to USD 307.504 million in 2025. By 2033, the market is projected to grow further to USD 484.427 million, with an average annual growth rate (CAGR) of 5.845%.

In today's experiential economy, consumers do not only buy a product, but also the experience that comes with it, so product packaging and design play an important role in shaping how people feel about what they buy. Tea is widely recognized as a healthy and high-quality beverage because it contains tea polyphenols, pigments, minerals, and other natural compounds that are good for the human body and environmentally friendly. Tea contains diverse bioactive compounds, including polyphenols such as catechins and phenolic acids, amino acids, flavonoid glycosides, and other metabolites, which contribute to its antioxidant properties and potential health benefits; furthermore, processing methods like fermentation can influence the relative levels of these constituents and thus affect both flavor and biological activity (Journal of Tea Science Research, 2024). Besides its health value, tea has also become a lifestyle choice for many consumers who want natural and safe products. Taiwan is especially well known for its diverse climate and geography, which allows many different types of tea to be grown, each with its own flavor, aroma, and quality. Because of this variety, Taiwanese tea producers are able to meet the tastes and needs of many different consumer groups, from traditional tea drinkers to younger consumers looking for new experiences.

The tea industry today faces many challenges in attracting consumers because competition is very strong and the pandemic has also changed people's buying behavior. Because of this situation, tea packaging has become very important for helping companies make their products more attractive and increase sales. The design of tea packaging does not only protect the product, but it also acts as a way for the product to communicate with consumers by giving information, creating first impressions, and influencing their decision to buy. According to Jing (2024), packaging elements such as color, design, material, and information transmission significantly influence consumers' decisions by shaping how they perceive products and interpret cues before purchase, indicating that well-designed packaging enhances product perception and purchasing intent by effectively communicating product information and emotional appeal.

METHOD

Research Design

This study uses a quantitative research design. Data will be collected through a survey using a structured questionnaire given to tea (Tea/Chá/茶) consumers. The data will be analyzed using Structural Equation Modeling (SEM) because SEM can test both direct and indirect relationships between variables, including the mediating effect of marketing strategy.

Population

The population in this research is all consumers who buy and drink tea products.

Sampling Technique

This study uses purposive sampling, meaning respondents are selected based on specific criteria, such as:

- a. consumers who have bought tea at least once in the last 6–12 months
- b. consumers aged 18 years and above

Sample Size

The recommended sample size for SEM is at least 5–10 times the number of indicators, or a minimum of 150–300 respondents. Therefore, this study plans to collect 250–300 valid responses to ensure accurate analysis.

Data Collection Method

Data will be collected using a questionnaire that contains statements related to packaging design, product innovation, marketing strategy, and purchase decisions.

The questionnaire will be distributed:

online (Google Form / social media / email)

Variable Definition & Measurement

All variables will be measured using a 5-point Likert scale:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree

Variables

a. Packaging Design (X1)

Measures consumer perception of tea product packaging, including design, color, shape, material, clarity of information, and attractiveness.

b. Product Innovation (X2)

Measures how innovative the tea product is, such as new flavors, product features, eco-friendly packaging, convenience, and uniqueness.

c. Marketing Strategy (M)

Measures promotion, branding, positioning, and how well the product is marketed to consumers.

d. Purchase Decision (Y)

Measures how likely consumers are to choose, buy, and recommend the tea product. Each variable will have several questionnaire items based on previous studies.

Data Analysis Technique

The data analysis steps include:

1. Descriptive statistics

- a. profile of respondents
- b. trends in responses

2. Validity and Reliability Tests

- a. Validity test: to check whether the statements measure what they should measure
- b. Reliability test (Cronbach's Alpha ≥ 0.70): to check consistency of responses

3. Measurement Model Testing (CFA / EFA)

- a. Exploratory Factor Analysis (EFA) — if needed, to group indicators
- b. Confirmatory Factor Analysis (CFA) — to confirm construct validity

4. Structural Equation Modeling (SEM) / PLS-SEM

Used to test:

- a. direct effects
- b. indirect (mediating) effects

5. Mediation Test

Mediation will be tested using bootstrapping, because it is more accurate than the traditional Sobel test.

6. Goodness-of-Fit Testing (if SEM-AMOS is used)

Examples:

- a. Chi-Square/df
- b. RMSEA
- c. CFI
- d. GFI
- e. TLI

RESULT AND DISCUSSION

Respondent Characteristics

This study collected data from 204 respondents who were selected through purposive sampling. The respondent characteristics are presented based on three demographic variables: age, student status, and tea consumption behavior in the past 6–12 months. These demographic profiles provide context for understanding the target population and their relevance to the research objectives.

Tabel 1. Age Distribution of Respondents

Age	Frequency	Percentage (%)
Under 18 years old	16	7.8
18–20 years old	53	26.0
21–25 years old	75	36.8
26–30 years old	37	18.1
31–35 years old	20	9.8
Above 35 years old	3	1.5
Total	204	100.0

Source: Primary Data (2026)

Table 1. shows that the majority of respondents were aged 21–25 years old, accounting for 75 respondents (36.8%), followed by the 18–20 years old group with 53 respondents (26.0%), and the 26–30 years old group with 37 respondents (18.1%). Respondents aged 31–35 years old comprised 20 individuals (9.8%), while those under 18 years old represented 16 respondents (7.8%). The smallest group was respondents above 35 years old, with only 3 individuals (1.5%). This age distribution indicates that the sample predominantly consists of young adults, which aligns with the study's focus on university students and their purchasing behavior.

Tabel 2. Student Status Distribution

Student Status	Frequency	Percentage (%)
No, I am not a student	56	27.5
Yes, I am a student	148	72.5
Total	204	100.0

Source: Primary Data (2026)

As presented in Table 2, the majority of respondents were currently students, with 148 individuals (72.5%), while 56 respondents (27.5%) were not students. This distribution is

consistent with the study's sampling strategy, which targeted university students as the primary population to examine their purchase decisions regarding tea products.

Tabel 3. Tea Consumption in the Past 6–12 Months

Have you consumed tea in the past 6–12 months?	Frequency	Percentage (%)
No	9	4.4
Yes	195	95.6
Total	204	100.0

Source: Primary Data (2026)

Table 3. reveals that the vast majority of respondents had consumed tea in the past 6–12 months, with 195 individuals (95.6%), while only 9 respondents (4.4%) reported no tea consumption during this period. This high consumption rate confirms that the respondents possess relevant experience with tea products, making them appropriate subjects for evaluating the influence of packaging design, product innovation, and marketing strategy on purchase decisions.

Validity and Reliability Testing

The validity and reliability testing in this study were conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach through SmartPLS 4.1.0.9 software. The measurement model (outer model) evaluation is essential to ensure that the indicators used accurately represent their respective constructs and produce consistent measurements. This evaluation consists of validity tests (convergent and discriminant validity) and reliability tests.

a. Convergent Validity

Convergent validity measures the extent to which indicators of the same construct are correlated. Two criteria are used to assess convergent validity: outer loadings (factor loadings) and Average Variance Extracted (AVE). An indicator is considered valid if its outer loading value is greater than 0.70, and the AVE value exceeds 0.50.

Tabel 4. Outer Loading Values

Variable	Indicator	Loading Factor	Threshold	Result
Packaging Design	X1.1	0.804	> 0.70	Valid
	X1.2	0.844	> 0.70	Valid
	X1.3	0.867	> 0.70	Valid
	X1.4	0.827	> 0.70	Valid
Product Innovation	X2.1	0.731	> 0.70	Valid
	X2.2	0.719	> 0.70	Valid
	X2.3	0.762	> 0.70	Valid
	X2.4	0.827	> 0.70	Valid
Marketing Strategy	Z1	0.882	> 0.70	Valid
	Z2	0.854	> 0.70	Valid
	Z3	0.883	> 0.70	Valid
	Z4	0.919	> 0.70	Valid
Purchase Decision	Y1	0.907	> 0.70	Valid
	Y2	0.820	> 0.70	Valid
	Y3	0.874	> 0.70	Valid
	Y4	0.877	> 0.70	Valid

Source: SmartPLS 4.1.0.9 Output (2026)

As shown in Table 4, all indicators across the four variables demonstrated outer loading values exceeding 0.70, ranging from 0.719 to 0.919. The highest loading was observed in indicator Z4 (0.919) of the Marketing Strategy variable, while the lowest was X2.2 (0.719) of

the Product Innovation variable. These results confirm that all indicators meet the convergent validity criteria and adequately measure their respective constructs.

Tabel 4. Average Variance Extracted (AVE) Values

Variable	AVE	Threshold	Result
Packaging Design	0.699	> 0.50	Valid
Product Innovation	0.579	> 0.50	Valid
Marketing Strategy	0.783	> 0.50	Valid
Purchase Decision	0.757	> 0.50	Valid

Source: SmartPLS 4.1.0.9 Output (2026)

Table 5. presents the AVE values for all variables, which ranged from 0.579 to 0.783, all exceeding the minimum threshold of 0.50. Marketing Strategy demonstrated the highest AVE (0.783), indicating that 78.3% of the variance in its indicators is explained by the construct. These results confirm that all variables satisfy the convergent validity requirement, suggesting that the indicators effectively capture the variance of their respective latent constructs.

b. Discriminant Validity

Discriminant validity assesses the extent to which a construct is distinct from other constructs. Three methods were employed to evaluate discriminant validity: cross-loading analysis, the Fornell-Larcker criterion, and the Heterotrait-Monotrait Ratio (HTMT).

Tabel 5. Cross Loading Values

	Marketing Strategy	Packaging Design	Product Innovation	Purchase Decision
X1.1	0.610	0.804	0.514	0.606
X1.2	0.593	0.844	0.538	0.583
X1.3	0.665	0.867	0.580	0.621
X1.4	0.566	0.827	0.558	0.600
X2.1	0.455	0.452	0.731	0.439
X2.2	0.403	0.544	0.719	0.386
X2.3	0.557	0.585	0.762	0.571
X2.4	0.605	0.441	0.827	0.686
Y1	0.783	0.659	0.640	0.907
Y2	0.587	0.548	0.528	0.820
Y3	0.723	0.621	0.685	0.874
Y4	0.728	0.673	0.596	0.877
Z1	0.882	0.614	0.610	0.686
Z2	0.854	0.629	0.573	0.685
Z3	0.883	0.606	0.613	0.706
Z4	0.919	0.725	0.605	0.804

Source: SmartPLS 4.1.0.9 Output (2026)

Table 6. demonstrates that each indicator's loading on its intended construct (shown in bold) is higher than its loadings on other constructs. This pattern confirms that the indicators are more strongly associated with their own constructs than with other constructs, thereby satisfying the cross-loading criterion for discriminant validity.

Tabel 6. Fornell-Larcker Criterion

	Marketing Strategy	Packaging Design	Product Innovation	Purchase Decision
Marketing Strategy	0.885			
Packaging Design	0.729	0.836		
Product Innovation	0.678	0.655	0.761	

Purchase Decision	0.816	0.721	0.707	0.870
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Source: SmartPLS 4.1.0.9 Output (2026)

The Fornell-Larcker criterion requires that the square root of each construct's AVE (diagonal values in bold) be greater than its correlations with other constructs (off-diagonal values). As shown in Table 7, all diagonal values exceed the corresponding row and column values, confirming adequate discriminant validity. For example, Marketing Strategy's square root of AVE (0.885) is higher than its correlations with Packaging Design (0.729), Product Innovation (0.678), and Purchase Decision (0.816).

Tabel 7. Heterotrait-Monotrait Ratio (HTMT)

	Marketing Strategy	Packaging Design	Product Innovation	Purchase Decision
Marketing Strategy				
Packaging Design	0.819			
Product Innovation	0.766	0.787		
Purchase Decision	0.911	0.814	0.836	

Source: SmartPLS 4.1.0.9 Output (2026)

The HTMT values presented in Table 4.8 are all below the conservative threshold of 0.90, with the highest value being 0.911 between Marketing Strategy and Purchase Decision, which slightly exceeds the threshold but remains acceptable under the more liberal criterion of 0.95. These results generally support discriminant validity, indicating that the constructs are sufficiently distinct from one another.

c. Reliability Test

Reliability testing examines the internal consistency of the measurement instruments. Two indicators are used: Cronbach's Alpha and Composite Reliability (CR). Both values should exceed 0.70 to indicate acceptable reliability.

Tabel 8. Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability	Threshold	Result
Packaging Design	0.863	0.903	> 0.70	Reliable
Product Innovation	0.789	0.845	> 0.70	Reliable
Marketing Strategy	0.908	0.934	> 0.70	Reliable
Purchase Decision	0.898	0.926	> 0.70	Reliable

Source: SmartPLS 4.1.0.9 Output (2026)

Table 9. indicates that all variables demonstrated strong internal consistency, with Cronbach's Alpha values ranging from 0.789 to 0.908 and Composite Reliability values ranging from 0.845 to 0.934. Marketing Strategy exhibited the highest reliability scores ($\alpha = 0.908$, CR = 0.934), while Product Innovation showed the lowest, though still acceptable, values ($\alpha = 0.789$, CR = 0.845). These findings confirm that all measurement instruments are reliable and produce consistent results.

d. Multicollinearity Test

Multicollinearity testing using Variance Inflation Factor (VIF) was conducted to ensure that predictor variables are not highly correlated with each other. A VIF value below 5.0 indicates the absence of problematic multicollinearity.

Tabel 9. Variance Inflation Factor (VIF) Values

Variable	Indicator	VIF
Packaging Design	X1.1	2.121
	X1.2	2.256
	X1.3	2.622
	X1.4	2.103
Product Innovation	X2.1	1.703
	X2.2	1.595
	X2.3	1.828
	X2.4	2.062
Marketing Strategy	Z1	2.960
	Z2	2.345
	Z3	2.807
	Z4	3.419
Purchase Decision	Y1	3.367
	Y2	2.027
	Y3	2.773
	Y4	2.850

Source: SmartPLS 4.1.0.9 Output (2026)

As presented in Table 10, all VIF values ranged from 1.595 to 3.419, well below the threshold of 5.0. The highest VIF value was observed in indicator Z4 (3.419) of the Marketing Strategy variable, while the lowest was in X2.2 (1.595) of Product Innovation. These results confirm that multicollinearity is not a concern in this study, allowing for unbiased estimation of path coefficients in the structural model.

Hypothesis Testing

Hypothesis testing was conducted using the bootstrapping technique with 5,000 subsamples in SmartPLS 4.1.0.9 to assess both direct and indirect (mediation) effects. The evaluation criteria include path coefficients (original sample), t-statistics, and p-values. A path is considered statistically significant if the t-statistic exceeds 1.96 and the p-value is less than 0.05 at a 5% significance level. The path coefficient indicates the direction and strength of the relationship, where positive values represent positive relationships and negative values indicate negative relationships.

a. Direct Effects

The direct effects testing examines the immediate relationships between the independent variables (Packaging Design and Product Innovation), the mediating variable (Marketing Strategy), and the dependent variable (Purchase Decision). Five direct hypotheses were tested in this study.

Tabel 10. Direct Effects Hypothesis Testing Results

Hypothesis	Path	Original Sample	T-Statistics	P-Value	Decision
H1	Packaging Design → Purchase Decision	0.191	2.522	0.012	Supported
H2	Product Innovation → Purchase Decision	0.229	4.286	0.000	Supported
H3	Packaging Design → Marketing Strategy	0.500	5.789	0.000	Supported
H4	Product Innovation → Marketing Strategy	0.351	4.907	0.000	Supported
H5	Marketing Strategy → Purchase Decision	0.521	6.888	0.000	Supported

Source: SmartPLS 4.1.0.9 Output (2026)

H1: The Effect of Packaging Design on Purchase Decision

The analysis reveals that Packaging Design has a positive and significant effect on Purchase Decision ($\beta = 0.191, t = 2.522, p = 0.012$). The t-statistic value of 2.522 exceeds the critical value of 1.96, and the p-value of 0.012 is below 0.05, indicating statistical significance. The positive path coefficient of 0.191 suggests that improvements in packaging design contribute to increased purchase decisions among university students. Therefore, H1 is supported.

H2: The Effect of Product Innovation on Purchase Decision

Product Innovation demonstrates a positive and significant influence on Purchase Decision ($\beta = 0.229, t = 4.286, p = 0.000$). With a t-statistic of 4.286 (> 1.96) and a p-value of 0.000 (< 0.05), this relationship is statistically significant. The path coefficient of 0.229 indicates that innovative tea products positively affect consumers' purchase decisions. Thus, H2 is supported.

H3: The Effect of Packaging Design on Marketing Strategy

The results show that Packaging Design significantly and positively influences Marketing Strategy ($\beta = 0.500, t = 5.789, p = 0.000$). This represents the strongest direct effect among all paths tested, with a path coefficient of 0.500. The t-statistic of 5.789 and p-value of 0.000 confirm strong statistical significance, suggesting that attractive packaging design enhances the effectiveness of marketing strategies. Therefore, H3 is supported.

H4: The Effect of Product Innovation on Marketing Strategy

Product Innovation has a positive and significant effect on Marketing Strategy ($\beta = 0.351, t = 4.907, p = 0.000$). The t-statistic of 4.907 exceeds 1.96, and the p-value of 0.000 is well below the significance threshold. The path coefficient of 0.351 indicates that innovative product features facilitate more effective marketing strategies. Hence, H4 is supported.

H5: The Effect of Marketing Strategy on Purchase Decision

Marketing Strategy exhibits the strongest direct influence on Purchase Decision among the predictor variables ($\beta = 0.521, t = 6.888, p = 0.000$). With a t-statistic of 6.888 and p-value of 0.000, this relationship is highly significant. The path coefficient of 0.521 demonstrates that effective marketing strategies are powerful drivers of purchase decisions in the tea industry. Accordingly, H5 is supported.

b. Indirect Effects / Mediation

The mediation analysis examines whether Marketing Strategy serves as an intervening variable that mediates the relationships between Packaging Design and Purchase Decision, as well as between Product Innovation and Purchase Decision. Mediation effects were tested using the bootstrapping procedure with 5,000 subsamples.

Tabel 11. Indirect Effects (Mediation) Hypothesis Testing Results

Hypothesis	Indirect Path	Original Sample	T-Statistics	P-Value	Decision
H6	Packaging Design → Marketing Strategy → Purchase Decision	0.261	5.565	0.000	Supported
H7	Product Innovation → Marketing Strategy → Purchase Decision	0.183	3.439	0.001	Supported

Source: SmartPLS 4.1.0.9 Output (2026)

The results presented in Table 12. demonstrate that Marketing Strategy significantly mediates both relationships tested in this study. The indirect effect of Packaging Design on Purchase Decision through Marketing Strategy is positive and statistically significant ($\beta =$

0.261, $t = 5.565$, $p = 0.000$), with the t-statistic substantially exceeding the critical value of 1.96. Notably, this indirect effect (0.261) is larger than the direct effect of Packaging Design on Purchase Decision (0.191), suggesting that Marketing Strategy plays a crucial mediating role in translating attractive packaging into actual purchase behavior. This finding indicates that while packaging design has inherent appeal, its influence on purchase decisions is substantially enhanced when accompanied by effective marketing strategies.

Similarly, Marketing Strategy significantly mediates the relationship between Product Innovation and Purchase Decision ($\beta = 0.183$, $t = 3.439$, $p = 0.001$). The t-statistic of 3.439 is well above 1.96, and the p-value of 0.001 confirms strong statistical significance. Although the indirect effect (0.183) is smaller than the direct effect of Product Innovation on Purchase Decision (0.229), it remains substantial and significant. This suggests that while innovative product features have direct appeal to consumers, their impact is further amplified when supported by effective marketing strategies that communicate the innovation to the target market.

Tabel 12. Summary of Total Effects

Path	Direct Effect	Indirect Effect	Total Effect
Packaging Design → Purchase Decision	0.191	0.261	0.452
Product Innovation → Purchase Decision	0.229	0.183	0.412

Source: SmartPLS 4.1.0.9 Output (2026)

Table 13. presents the total effects, which combine both direct and indirect pathways. The total effect of Packaging Design on Purchase Decision (0.452) is stronger than that of Product Innovation (0.412). Interestingly, for Packaging Design, the indirect effect through Marketing Strategy (0.261) exceeds the direct effect (0.191), highlighting the critical importance of marketing strategies in translating attractive packaging into actual purchases. Conversely, Product Innovation exerts a stronger direct effect (0.229) than its indirect effect (0.183), suggesting that innovative features have inherent appeal that directly drives purchase decisions, though this is still enhanced by marketing efforts. These patterns of mediation indicate that both variables benefit from strategic marketing, but Packaging Design is particularly dependent on marketing communication to maximize its impact on consumer behavior.

c. Model Evaluation

The structural model was evaluated using the coefficient of determination (R^2) and the predictive relevance (Q^2) obtained from the blindfolding procedure. The R^2 value indicates the proportion of variance in the endogenous variables explained by their predictors, while Q^2 assesses the model's predictive accuracy.

Tabel 13. R-Square Values

Endogenous Variable	R-Square	R-Square Adjusted	Interpretation
Marketing Strategy	0.602	0.598	Moderate
Purchase Decision	0.725	0.721	Substantial

Source: SmartPLS 4.1.0.9 Output (2026)

Tabel 14. Predictive Relevance (Q^2) Values

Endogenous Variable	Q^2 (Construct Cross-Validated Redundancy)	Interpretation
Marketing Strategy	0.462	Good predictive relevance
Purchase Decision	0.539	Good predictive relevance

Source: SmartPLS 4.1.0.9 Output (2026)

The structural model demonstrates strong overall performance based on multiple evaluation criteria. As shown in Table 4.14, the R^2 value for Marketing Strategy is 0.602, indicating that 60.2% of the variance in Marketing Strategy is explained by Packaging Design and Product Innovation. According to Hair et al. (2019), R^2 values of 0.25, 0.50, and 0.75 are considered weak, moderate, and substantial, respectively. Thus, the R^2 of 0.602 represents moderate explanatory power, suggesting that the two independent variables adequately account for variations in marketing strategy effectiveness. The R^2 value for Purchase Decision is 0.725, demonstrating that 72.5% of the variance in Purchase Decision is explained by Packaging Design, Product Innovation, and Marketing Strategy combined. This substantial R^2 value indicates that the model has strong explanatory power and effectively captures the key factors influencing purchase decisions in the tea industry among university students.

Beyond explanatory power, the model's predictive accuracy was assessed through the blindfolding procedure, which generated Q^2 values presented in Table 4.15. The Q^2 value of 0.462 for Marketing Strategy and 0.539 for Purchase Decision both substantially exceed the threshold of zero, which is the minimum requirement for predictive relevance. According to Hair et al. (2019), Q^2 values greater than 0, 0.25, and 0.50 indicate small, medium, and large predictive relevance, respectively. The Q^2 value of 0.462 for Marketing Strategy indicates medium to large predictive relevance, while the Q^2 value of 0.539 for Purchase Decision demonstrates large predictive relevance. These results confirm that the model not only explains past observations well but also possesses adequate predictive accuracy to forecast future outcomes.

In summary, the comprehensive evaluation of the structural model reveals strong performance across all tested criteria. All seven hypotheses—comprising five direct effects and two mediation effects—were statistically supported. The model demonstrates substantial explanatory power for Purchase Decision ($R^2 = 0.725$) and moderate explanatory power for Marketing Strategy ($R^2 = 0.602$). Additionally, the model exhibits good predictive relevance for both endogenous variables ($Q^2 = 0.462$ and 0.539). These findings collectively validate the proposed theoretical framework and confirm that Packaging Design and Product Innovation directly influence Purchase Decision, with Marketing Strategy serving as a significant mediating mechanism that amplifies these effects.

Discussion

The findings of this study provide comprehensive insights into how packaging design and product innovation influence purchase decisions in the tea industry, with marketing strategy serving as a critical mediating mechanism. The results confirm all seven hypotheses, demonstrating that both direct and indirect pathways significantly shape consumer behavior among university students in Taiwan. This discussion interprets these findings in relation to existing theoretical frameworks and empirical evidence, highlighting their theoretical contributions and practical implications for the tea industry.

The Direct Influence of Packaging Design on Purchase Decision

The study confirms that packaging design significantly and positively influences purchase decisions ($\beta = 0.191$, $p = 0.012$), supporting the notion that visual and aesthetic elements of product packaging serve as important cues in consumer decision-making. This finding aligns with Wang, Mustaffa, and Mahbob (2025), who demonstrated that visual elements of packaging design significantly impact purchase intention by creating favorable first impressions and communicating product quality. In the context of the tea industry, where product differentiation is often challenging due to the intangible nature of taste and aroma prior to purchase, packaging becomes a tangible touchpoint that conveys brand identity and product value. The positive effect observed in this study suggests that university students, who are increasingly exposed to modern design aesthetics through digital media, respond

favorably to well-designed tea packaging that balances traditional cultural elements with contemporary visual appeal.

However, it is noteworthy that the direct effect of packaging design on purchase decisions (0.191) is relatively modest compared to other paths in the model, particularly when compared to the effect of marketing strategy (0.521). This suggests that while attractive packaging captures attention and creates initial interest, it alone may not be sufficient to drive final purchase behavior without additional support from marketing communications. This observation is consistent with Jing (2024), who argued that packaging elements such as color, design, and material significantly influence consumer perceptions but require effective information transmission to fully convert interest into purchase action. The relatively stronger indirect effect of packaging design through marketing strategy (0.261) further reinforces this interpretation, indicating that packaging design achieves its maximum impact when integrated into a comprehensive marketing strategy.

The Direct Influence of Product Innovation on Purchase Decision

Product innovation demonstrates a significant positive effect on purchase decisions ($\beta = 0.229$, $p = 0.000$), confirming that novel features, flavors, and product attributes directly appeal to consumers and motivate purchase behavior. This finding is consistent with the innovation adoption literature, which suggests that consumers, particularly younger demographics, are attracted to products that offer new experiences and differentiate themselves from traditional offerings. Zhou and Li (2025) emphasized that innovations in tea product development, including new flavor combinations and functional ingredients, are crucial for attracting younger consumers who seek variety and health benefits beyond conventional tea products. The significant effect observed in this study indicates that university students in Taiwan value innovative tea products that align with modern lifestyle preferences, such as ready-to-drink formats, fusion flavors, and eco-friendly packaging materials.

The direct effect of product innovation (0.229) is slightly stronger than that of packaging design (0.191), suggesting that substantive product improvements have a more immediate impact on purchase decisions than aesthetic considerations alone. This pattern reflects the experiential nature of food and beverage consumption, where actual product attributes ultimately determine satisfaction and repeat purchase. However, similar to packaging design, product innovation also benefits from marketing strategy mediation, as evidenced by the significant indirect effect (0.183). This suggests that while innovative features have inherent appeal, their value must be effectively communicated to consumers through marketing channels to maximize their influence on purchase behavior.

The Critical Role of Marketing Strategy

Marketing strategy emerges as the strongest direct predictor of purchase decisions in this study ($\beta = 0.521$, $p = 0.000$), underscoring its pivotal role in translating product attributes into consumer action. This finding corroborates the marketing mix literature, which emphasizes that effective promotion, positioning, and branding strategies are essential for influencing consumer perceptions and purchase intentions. Khan et al. (2023) demonstrated that integrated marketing mix strategies significantly affect consumer buying behavior by creating brand awareness, communicating value propositions, and building emotional connections with target audiences. In the context of the tea industry, where competition is intense and product differentiation is challenging, marketing strategy serves as the mechanism through which companies can effectively reach university students, communicate product benefits, and create compelling reasons to choose their products over competitors.

The dominance of marketing strategy in directly influencing purchase decisions (0.521) compared to packaging design (0.191) and product innovation (0.229) highlights a critical

insight: superior products and attractive packaging are necessary but not sufficient conditions for market success. Without effective marketing strategies to create awareness, educate consumers about product benefits, and establish brand positioning, even well-designed and innovative products may fail to achieve their market potential. This is particularly relevant for tea producers in Yunlin County, who, as noted in the problem statement, often prioritize product quality and traditional production methods but lack sophisticated marketing capabilities compared to competitors in major urban centers.

Marketing Strategy as a Mediating Mechanism

The mediation analysis reveals that marketing strategy significantly amplifies the effects of both packaging design and product innovation on purchase decisions. For packaging design, the indirect effect through marketing strategy (0.261) actually exceeds the direct effect (0.191), resulting in a total effect of 0.452. This pattern indicates partial mediation with a dominant indirect pathway, suggesting that packaging design's influence on purchase decisions operates primarily through its interaction with marketing communications. Effective marketing strategies leverage attractive packaging in promotional materials, social media content, and point-of-sale displays, thereby multiplying the visual impact of packaging beyond its immediate shelf presence. This finding supports Gao and Astillero (2022), who argued that product packaging serves as a foundation for purchase decisions but achieves maximum effectiveness when integrated into broader marketing communications that reinforce brand messages and product positioning.

Similarly, marketing strategy mediates the relationship between product innovation and purchase decisions ($\beta = 0.183$, $p = 0.001$), though the indirect effect is smaller than the direct effect (0.229), resulting in a total effect of 0.412. This pattern of partial mediation with a stronger direct pathway suggests that product innovation has inherent appeal that directly drives purchases, but its impact is further enhanced when marketing strategies effectively communicate the innovative features to target consumers. This finding aligns with Sánchez-Torres, Sandoval-Almanza, and Sandoval-Almanza (2023), who demonstrated that marketing capabilities mediate the relationship between innovation and business performance by translating innovation investments into market outcomes through effective communication and customer engagement.

The contrasting mediation patterns for packaging design and product innovation provide important theoretical insights. Packaging design, being a visual and symbolic element, relies heavily on marketing amplification to fully realize its influence, as its aesthetic appeal must be consistently communicated across multiple touchpoints to shape consumer perceptions. In contrast, product innovation, representing tangible functional benefits, has more direct appeal to consumers who can experience and evaluate these benefits through trial and consumption. Nevertheless, both pathways benefit significantly from marketing support, confirming the central role of marketing strategy in the success of tea products among university students.

Comparative Analysis and Theoretical Implications

When comparing the total effects, packaging design (0.452) exerts a slightly stronger overall influence on purchase decisions than product innovation (0.412). This finding suggests that in the tea industry context, where sensory evaluation is limited prior to purchase, visual and symbolic cues conveyed through packaging may be particularly influential in the initial purchase decision, especially among university students who are highly responsive to aesthetic appeal and brand image. However, the relatively balanced total effects of both variables indicate that a dual strategy emphasizing both attractive packaging and genuine product innovation is optimal for maximizing purchase behavior.

The substantial R^2 value for purchase decisions (0.725) indicates that the three predictor variables collectively explain 72.5% of the variance, demonstrating strong explanatory power.

This suggests that the theoretical framework effectively captures the key drivers of purchase decisions in the tea industry among university students. The moderate R^2 for marketing strategy (0.602) indicates that packaging design and product innovation adequately explain marketing strategy effectiveness, though other factors such as competitive intensity, distribution channels, and promotional budgets may also contribute. The strong predictive relevance values ($Q^2 = 0.539$ for purchase decisions) further validate the model's robustness and its ability to predict future consumer behavior.

Practical Implications for the Tea Industry

These findings offer actionable insights for tea producers, particularly those in traditional production regions like Yunlin County who seek to attract younger consumers. First, companies should invest in modernizing packaging design to appeal to university students' aesthetic preferences while maintaining cultural authenticity. This includes using contemporary color schemes, minimalist layouts, and sustainable materials that resonate with environmentally conscious young consumers. Second, product innovation should focus on developing new flavors, convenient formats, and functional ingredients that align with modern lifestyle trends, such as health-enhancing botanicals or ready-to-drink options suitable for busy student schedules.

Most critically, however, the findings emphasize that packaging improvements and product innovations must be accompanied by sophisticated marketing strategies to maximize their impact. Tea companies should develop integrated marketing campaigns that leverage digital channels, social media influencers, and experiential marketing events to reach university students where they spend their time and attention. Marketing communications should explicitly highlight both the visual appeal of packaging and the innovative features of products, creating cohesive brand narratives that differentiate their offerings in a crowded market. For traditional tea producers in Yunlin County who may lack marketing expertise, partnerships with marketing agencies or collaborations with universities for student-driven campaigns could provide cost-effective pathways to enhance marketing capabilities.

Limitations and Future Research Directions

While this study provides valuable insights, several limitations should be acknowledged. The sample was limited to university students, which, while appropriate for examining younger consumer segments, may not generalize to older tea consumers with different preferences and decision-making processes. Future research could examine how these relationships vary across different age groups, income levels, and cultural contexts. Additionally, the study focused on purchase decisions at a single point in time, without examining post-purchase satisfaction, repurchase intentions, or brand loyalty. Longitudinal studies tracking consumer behavior over time would provide insights into whether the effects of packaging design and product innovation are sustained or diminish as novelty wears off. Finally, while the study confirms the mediating role of marketing strategy, it treats marketing strategy as a unidimensional construct. Future research could disaggregate marketing strategy into specific components such as digital marketing, influencer partnerships, pricing strategies, and distribution channel choices to identify which specific marketing tactics are most effective for different product attributes and consumer segments.

CONCLUSION

In conclusion, this study demonstrates that packaging design and product innovation have significant positive effects on consumer purchase decisions in the tea industry, particularly among university students. Attractive packaging design helps create first impressions and enhances product appeal, while product innovation provides added value that meets modern consumer preferences. However, the findings indicate that these factors alone

are not sufficient to maximize purchase decisions without the support of an effective marketing strategy. Marketing strategy plays a crucial mediating role in strengthening the relationship between packaging design, product innovation, and purchase decisions.

The results also reveal that marketing strategy has the strongest direct influence on purchase decisions compared to packaging design and product innovation. This suggests that well-designed packaging and innovative products must be supported by effective marketing efforts, such as digital promotion, branding, and positioning, to effectively reach target consumers. Furthermore, the mediation analysis confirms that marketing strategy enhances the impact of packaging design and product innovation, indicating that companies should integrate these elements into a comprehensive marketing approach.

Overall, this study highlights that the success of tea products in attracting university students depends on the synergy between packaging design, product innovation, and marketing strategy. Tea producers, particularly in traditional regions such as Yunlin County, are encouraged to modernize packaging design, continuously develop innovative products, and implement strategic marketing initiatives to improve competitiveness and influence consumer purchase decisions. These findings contribute to the development of marketing and product strategies in the tea industry and provide practical insights for businesses seeking to engage younger consumers in a competitive market.

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