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Public Attitudes Towards Pre-Cooked Food: A Multivariate Survey on Trust, Food Security, Health and Willingness to Eat Pre-Cooked Food in Daily Life

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Abstract: This study investigates consumer perceptions and purchasing behaviors related to pre-cooked food using multidimensional data analysis. The findings highlight food safety, product diversity, and price as the primary factors influencing consumer choices. Education level and gender play significant roles in shaping purchasing decisions: individuals with higher education levels tend to exhibit greater awareness and acceptance of pre-cooked food, while women generally express stronger concerns about food safety and freshness compared to men. Furthermore, occupation is closely associated with purchase frequency-office workers are more likely to buy pre-cooked food, and consumers who frequently cook at home demonstrate a higher inclination to purchase these products. Factor analysis revealed two key dimensions affecting consumers' continued consumption intention: the product perception dimension and the quality and safety dimension. Cluster analysis further divided consumers into two distinct groups-one emphasizing food safety and product diversity, and another prioritizing price and cost-effectiveness. Overall, these results offer practical insights for developing targeted marketing strategies in the pre-cooked food sector and provide a valuable foundation for future studies on consumer behavior and market segmentation.

Keywords: pre-cooked food; China; customer attitude; food security; consumer behavior

1. Introduction

As modern life accelerates and urbanization deepens, consumer demand for convenient, healthy, and high-quality food has grown significantly. Pre-cooked food, an emerging category in the food industry, has rapidly gained popularity due to its convenience, time-saving features, and diverse range of flavors.

According to the standards issued by the China National Food Industry Association, pre-cooked food refers to dishes made from one or more raw or auxiliary ingredients, supplemented with seasonings (including food additives), and processed through steps such as pre-selection, preparation, forming, packaging, refrigeration, and freezing. These products are stored, transported, and sold under cold chain conditions, offering a ready-to-eat solution that bridges the gap between home-cooked meals and restaurant takeout. Pre-cooked food typically includes semi-finished or fully prepared items made from agricultural, livestock, poultry, and aquatic products. They are produced in standardized facilities, seasoned appropriately, and distributed through cold chain logistics to retail and

catering outlets, where they can be consumed directly or prepared with minimal additional cooking [1].

Currently, pre-cooked food on the market can be categorized into several main types:

(1) Pre-prepared meals, such as crispy pork or pickled fish, which require stir-frying or heating before serving;

(2) Instant-heat food, including quick-frozen dumplings and convenience-store meals that only need reheating;

(3) Instant food, such as porridge, canned dishes, and ready-to-eat braised meals that can be consumed directly after opening;

(4) Ready-to-eat food, such as salads and pre-washed vegetables, which are ready for immediate consumption after packaging.

The pre-cooked food supply chain is composed of three main segments: upstream raw material suppliers, midstream production enterprises, and downstream retail and service providers. On the retail side, the market is divided into two main segments-the B-end (business) and the C-end (consumer). The B-end market, driven by cost efficiency, primarily serves central kitchens for restaurants and hotels, while the C-end market targets individual consumers. With changing social and economic conditions, pre-cooked food continues to meet diverse consumer needs across multiple scenarios, gaining increasing recognition and acceptance among consumers [2].

In 2023, China's No. 1 Central Document officially mentioned the development of the pre-cooked food industry for the first time. In recent years, the promotion of the "Great Food Concept" and the emphasis on national food security have further underscored the strategic importance of pre-cooked food for enhancing food reserves and ensuring supply stability. The COVID-19 pandemic also reshaped lifestyle habits, encouraging home cooking and reducing outdoor dining. As a result, pre-cooked food-offering convenience, reduced preparation time, and consistent quality-has become increasingly favored by consumers. By simplifying complex cooking processes such as washing, chopping, and seasoning, pre-cooked food has expanded consumer awareness and acceptance, contributing to the rapid growth of the consumer market.

The rise of the "lazy economy" and "stay-at-home economy," coupled with improvements in cold chain logistics and the expansion of restaurant chains, has unleashed the full potential of the pre-cooked food sector. Valued for its convenience, the market has been growing steadily with strong prospects. Data indicate that China's pre-cooked food market reached RMB 516.5 billion (approximately USD 69.8 billion) in 2023, marking a year-on-year growth rate of 23.1%. Over the next five years, the industry is expected to maintain an annual growth rate of around 20%. According to the Five-Year Plan (2021-2025) released by the China Cuisine Association, the penetration rate of pre-cooked food in China remains relatively low at 10-15%. By 2030, it is projected to reach 15-20%, with the market size expected to exceed RMB 1.2 trillion. Although the overall market is large, China's pre-cooked food penetration rate still lags behind that of countries such as Japan and the United States, where it is close to 50%. This indicates that China's pre-cooked food industry remains in an early stage of development but holds substantial potential for expansion [3].

Despite strong policy support, China's pre-cooked food industry emerged later than those in developed economies. Its recent rapid growth can be attributed to technological advancements in cold chain logistics, the expansion of the convenience-oriented economy, and the flourishing food delivery sector. Overall, the industry is transitioning from a stage of fragmented development to one characterized by standardization, scaling, and refined industrial practices.

2. Literature Review

2.1. Background

With strong government policy support, China's pre-cooked food industry has entered a phase of rapid expansion, driven by the growing market size and shifting consumer lifestyles. However, compared with developed countries, China's pre-cooked food market developed relatively late, influenced by the advancement of cold chain technology, the rise of the "lazy economy," and the increasing prevalence of takeaway culture. As a result, the industry has only recently entered a stage of accelerated growth. Overall, it is transitioning from a fragmented and loosely organized market toward greater standardization, scalability, and efficiency.

Despite favorable policies, the industry still faces several challenges related to product quality, flavor retention, food safety, and standardization. Future development is expected to focus on higher quality, enhanced standardization, larger-scale production, industrialization, and the adoption of intelligent manufacturing technologies. Two persistent pain points remain: the absence of unified national standards, certification, and traceability systems; and relatively low consumer recognition and acceptance of pre-cooked food.

Producers also encounter technological difficulties in ensuring food safety, maintaining nutritional value, controlling raw material quality, and improving processing equipment. Some consumers continue to express skepticism toward pre-cooked food, raising concerns about freshness and safety. Potential food safety risks not only threaten consumer health but also restrict industry growth. Research has shown that consumers' attitudes, perceived social expectations, and sense of behavioral control can significantly shape their willingness to engage with food safety regulation, suggesting that greater public participation in safety oversight could foster more positive attitudes toward pre-cooked food [4].

Existing studies have examined the safety risks throughout the supply chain-from raw material sourcing and processing to storage, transportation, and sales-and proposed strategies to strengthen material quality control, improve production processes, optimize logistics conditions, and enhance packaging and labeling. These improvements aim to reduce potential hazards and enhance consumer trust. Other research has found that product quality, flavor, safety assurance, and packaging technology have strong positive effects on consumers' purchase intentions.

Most current studies focus on macro-level topics such as government support, industrial alliances, operational efficiency, and technological innovation, while research on consumer-level (C-end) behavior remains limited. Historically, the market has been dominated by business-to-business (B-end) sales, primarily serving catering enterprises and hotels. However, as individual consumer demand grows, pre-cooked food has gradually transitioned from restaurant kitchens to household dining tables, driving the rise of the consumer market. At present, the B-end to C-end market ratio is roughly 7:3. With consumers placing greater emphasis on health and food safety, both acceptance and purchase frequency of pre-cooked food continue to rise.

The expansion of cold chain logistics, the widespread use of home appliances such as refrigerators and microwaves, and the increasing participation of women in the workforce have made the consumer market a key growth driver for the industry. Understanding the factors influencing purchase intentions is therefore essential. While pre-cooked food offers convenience, its pre-processed nature can make it difficult for consumers to assess quality directly, leading to doubts about additives, nutritional content, hygiene, ingredient sourcing, and taste.

Previous research has emphasized the influence of consumer characteristics, motivations, and social environments on purchasing behavior. Consumers tend to be price-sensitive during the early stages of market adoption, making discounts and promotions particularly effective. Social norms and cultural expectations also shape dietary choices; for example, the traditional Chinese preference for fresh ingredients poses

challenges for maintaining freshness and flavor in pre-cooked foods. Taste, convenience, and reliability are major positive factors that encourage purchase, while distrust and a lack of familiarity with product preparation or ingredients discourage consumption [5].

The Theory of Planned Behavior (TPB) and the Stimulus-Organism-Response (S-O-R) model are widely applied frameworks for explaining consumer behavior. TPB suggests that attitudes, subjective norms, and perceived behavioral control jointly determine purchase intentions, which in turn drive consumer decisions. The S-O-R model examines how external stimuli-such as marketing messages, product quality, and environmental cues-influence psychological responses and ultimately consumer actions. Drawing on these frameworks, the present study explores the psychological and situational factors that shape consumer behavior in the pre-cooked food market.

2.2. Significance of the Study

Consumers' perceptions and attitudes toward pre-cooked food play a decisive role in their willingness to continue purchasing such products, directly affecting the market's sustainable development. However, previous studies have generally analyzed consumers as a single homogeneous group, without sufficient differentiation among demographic or behavioral subsegments. Comparative research across consumer groups-such as by gender, age, education level, or occupation-remains limited. This study aims to address these gaps by identifying the diverse factors that influence consumer perceptions and willingness to purchase pre-cooked food. Through data-driven analysis, it provides practical insights to guide industry stakeholders in developing more targeted marketing and product strategies [6-10].

2.3. Research Questions

Consumer Characteristics and Pre-Cooked Food Consumption Behavior

1) Does gender significantly influence the frequency of pre-cooked food purchases?
2) Is there a relationship between education level and consumers' perceptions of food safety and acceptance of pre-cooked food?
3) Are there notable differences in purchase frequency among consumers of different age groups?

Pre-Cooked Food and Food Safety Perception

1) Are there significant differences in perceptions of food safety assurance among consumers with different education levels?
2) Does gender affect consumers' trust in the safety of pre-cooked food?

Consumption Motivation and Preferences

Does the primary motivation for purchasing pre-cooked food-such as convenience, time-saving, or ease of preparation-vary by age or occupation?

Consumption Behavior and Purchase Channels

Which consumer groups (e.g., students, office workers, or retirees) are more likely to purchase pre-cooked food frequently?

3. Methods

3.1. Research Context

In 2022, China's pre-cooked food market reached an estimated value of USD 57.5 billion, reflecting a year-on-year growth rate of 21.3%. The market is projected to continue expanding at an annual rate of approximately 20%, reaching around USD 144.9 billion by 2026. Despite this strong growth momentum, consumer awareness and understanding of pre-cooked food remain limited. This study aims to identify and analyze the key factors that influence Chinese consumers' intentions to purchase pre-cooked food.

3.2. Study Instrument

The research utilized a structured questionnaire designed to reflect the characteristics of pre-cooked food and the consumption habits of Chinese consumers, drawing upon insights from previous studies. The questionnaire consisted of four main sections, comprising a total of 30 questions [7-9]:

Section 1: Basic demographic information, including gender, age, education level, occupation, and income.

Section 2: Consumer perceptions of pre-cooked food, such as definitions, familiarity, and consumption frequency.

Section 3: Factors influencing purchase intentions, including price, flavor, quality, safety, convenience, and product diversity.

Section 4: Consumers' opinions on current market challenges and their expectations for future development within the pre-cooked food industry [10-15].

3.3. Sample

The study focused on consumers residing in China. Due to geographical and logistical constraints, data were collected through an online survey conducted via Questionnaire Star, a widely used Chinese survey platform. The questionnaire was distributed through WeChat and QQ, two popular social networking applications, between January 8 and January 13, 2025. A total of 353 responses were received, of which 14 were excluded due to incompleteness or excessively short response times, leaving 339 valid responses. Among these respondents, 118 were male (34.8%) and 221 were female (65.2%).

3.4. Data Analysis

A series of statistical techniques were applied to analyze the collected data:

Section 1: Descriptive statistics, including frequency and percentage analysis, were used to summarize respondents' demographic characteristics.

Section 2: One-way and two-way analyses of variance (ANOVA) were employed to examine differences in consumer perceptions and behaviors across demographic groups.

Section 3: Exploratory factor analysis (EFA) was performed to identify the underlying dimensions influencing consumer evaluations of pre-cooked food. Reliability testing confirmed that Cronbach's alpha values exceeded 0.6, indicating acceptable internal consistency.

3.5. Study Limitations

Although the pre-cooked food industry in China is expanding rapidly, it is shaped by evolving consumer preferences and technological developments, making the findings of this study time-sensitive. Moreover, the use of an online survey may have introduced sample bias, particularly regarding gender distribution and regional representation. Future research could employ more rigorous sampling techniques, such as stratified or random sampling, and incorporate face-to-face interviews to improve representativeness. Additionally, integrating advanced statistical modeling and longitudinal data collection could further enhance the robustness and generalizability of future analyses.

4. Results

4.1. Descriptive Statistical Analysis of the Characteristics of the Surveyed Consumer Group

The demographic characteristics of the surveyed consumers encompassed six key aspects: gender, age, educational level, occupation, income level, and cooking frequency. As presented in Table 1, the majority of respondents were female (n = 221, 65.20%), while males accounted for 34.80% (n = 118). In terms of age distribution, the sample was predominantly composed of young adults, with 112 respondents under 20 years old (33.00%), 130 respondents aged 20-40 (38.30%), 91 respondents aged 41-60 (26.80%), and only six respondents over 60 years old (1.80%).

Table 1. Descriptive statistical analysis of the characteristics of the surveyed consumer group.

Variable	Levels	n	%
Gender	Male	118	34.80
	Female	221	65.20
Age	< 20	112	33.00
	20-40	130	38.30
	41-60	91	26.80
	> 60	6	1.80
Education level	Junior high school and below	4	1.20
	High school/technical secondary school	25	7.40
	Junior college	143	42.20
	Undergraduate course	70	20.60
	Master's degree or above	97	28.60
Occupation	Student	138	40.70
	Office worker	158	46.60
	Freelancer	15	4.40
	Retiree	7	2.10
	Unemployed	4	1.20
	Other	17	5.00
Monthly income (CNY)	< 3000	155	45.70
	3000-5000	30	8.80
	5001-8000	66	19.50
	8001-10000	52	15.30
	> 10000	36	10.60
Frequency of cooking at home (per week)	< 1	129	38.10
	1-3	97	28.60
	3-5	54	15.90
	> 5	59	17.40

Regarding occupation, students and office workers constituted the two largest groups, representing 40.70% (n = 138) and 46.60% (n = 158) of the sample, respectively. Other groups, including freelancers (n = 15, 4.40%), retirees (n = 7, 2.10%), unemployed individuals (n = 4, 1.20%), and those classified as "other" (n = 17, 5.00%), accounted for smaller proportions [16-19].

The income distribution reflected the relatively high proportion of students among the respondents. Most participants reported a monthly income below 3,000 CNY (approximately 405 USD) (45.70%, n = 155). Those earning between 3,000-5,000 CNY (676 USD) accounted for 8.80% (n = 30), while 19.50% (n = 66) reported incomes ranging from 5,001-8,000 CNY (1,081 USD). A further 15.30% (n = 52) earned between 8,001-10,000 CNY, and 10.60% (n = 36) reported monthly earnings exceeding 10,000 CNY (1,351 USD).

With respect to cooking frequency, 38.10% (n = 129) of respondents cooked less than once per week, 28.60% (n = 97) cooked one to three times per week, 15.90% (n = 54) cooked three to five times per week, and 17.40% (n = 59) cooked more than five times per week. Overall, the sample composition suggests a predominance of young, educated, and

economically diverse consumers, providing a representative foundation for analyzing attitudes toward pre-cooked food consumption [20].

Pre-cooked food is generally classified into four categories: ready-to-cook, ready-to-heat, ready-to-eat, and ready-to-assemble products. Among the respondents, 76.70% (n = 339) identified ready-to-cook food as pre-cooked food, while 78.20% recognized ready-to-heat food as belonging to this category. Additionally, 59.60% regarded ready-to-eat food as pre-cooked food, and 41.30% associated ready-to-assemble food with the same concept. These results indicate that more than half of the respondents' understanding of pre-cooked food corresponds to its broad definition [21].

As shown in Table 2 (Cognition of Pre-Cooked Food: Education Level × Gender Crosstabulation), 52.50% of participants reported having a good understanding of pre-cooked food, while 46.60% were somewhat familiar with it but lacked in-depth knowledge. Only 0.90% of respondents were entirely unfamiliar with the concept. Among male respondents, 54.20% (n = 118) demonstrated a clear understanding of pre-cooked food, and 79.70% (n = 64) of these men possessed a college degree. Among female respondents, 51.60% (n = 221) showed a clear understanding of pre-cooked food, and 94.70% (n = 108) of them held a college degree.

Table 2. Cognition of pre-cooked food (Eductionlevel * Gender Crosstabulation).

Gender	Cognition of Pre-Cooked Food	Junior School or Below	High School / Technical School	Junior College	Undergraduate	Master's Degree or Above	Total
Male	Know	2	11	21	13	17	64
	Only heard	1	5	19	11	17	53
	Don't know	0	0	0	1	0	1
	Total	3	16	40	25	34	118
Female	Know	0	6	50	25	33	114
	Only heard	0	3	52	20	30	105
	Don't know	1	0	1	0	0	2
	Total	1	9	103	45	63	221
Total	Know	2	17	71	38	50	178
	Only heard	1	8	71	31	47	158
	Don't know	1	0	1	1	0	3
	Total	4	25	143	70	97	339

A further statistical analysis was conducted to examine whether gender and education level significantly influenced respondents' understanding of pre-cooked food. The Pearson Chi-square test revealed no significant association between education level and cognitive understanding among male respondents ($p = 0.70 > 0.05$). However, for female respondents, the results indicated a significant relationship ($p < 0.05$), suggesting that gender and education level jointly affected women's understanding of pre-cooked food.

4.2. Analysis of the Survey

The mean scores of key factors influencing consumers' perceptions of pre-cooked food are summarized in Table 3. The three factors with the highest mean values were *strengthening food safety supervision* (M = 4.33, SD = 1.01), *ensuring ingredient freshness* (M = 4.00, SD = 1.09), and *improving taste* (M = 3.91, SD = 1.16). These findings indicate that consumers place considerable emphasis on the safety and quality aspects of pre-cooked food.

Table 3. The important factors of improving pre-cooked food.

Survey questions	*n*	*M*	*SD*
Improve the taste	339	3.91	1.16
Ensure freshness of ingredients	339	4.00	1.09
Strengthen food safety supervision	339	4.33	1.01
Reduced price	339	3.80	1.12
Rich the variety	339	3.81	1.22
Guaranteed food safety	339	2.97	0.93

The highest mean score for *strengthening food safety supervision* underscores that food safety remains the foremost concern among consumers, reflecting strong expectations for tighter regulatory oversight throughout the stages of production, processing, and storage. Likewise, the focus on *ensuring ingredient freshness* demonstrates consumers' desire for products that retain the natural qualities of raw ingredients, emphasizing freshness as a core dimension of perceived quality. The relatively high mean score for *improving taste* further suggests that flavor plays a decisive role in shaping purchasing behavior, underscoring the importance for manufacturers to enhance sensory appeal and culinary satisfaction in pre-cooked food development.

In contrast, the three factors with the lowest mean scores were *do you believe the safety of pre-cooked food is guaranteed* (M = 2.97, SD = 0.93), *lowering prices* (M = 3.80, SD = 1.12), and *diversifying product options* (M = 3.81, SD = 1.22). The lowest score, *do you believe the safety of pre-cooked food is guaranteed*, indicates that many consumers remain skeptical about food safety, reflecting a potential trust issue within the industry. Although *lowering prices* and *diversifying product options* received relatively lower scores, these factors still represent areas for improvement, particularly for price-sensitive consumer groups.

Tests of normality (Table 4), including the Kolmogorov-Smirnov and Shapiro-Wilk tests, showed that all variables significantly deviated from a normal distribution ($p < 0.05$). The Shapiro-Wilk statistic for *strengthening food safety supervision* was the lowest (Statistic = 0.692), indicating the greatest deviation from normality. Other variables' statistics ranged from 0.69 to 0.87, further confirming the non-normal distribution of the data. According to the central limit theorem, when the sample size is sufficiently large, the sampling distribution of the mean approximates a normal distribution regardless of the original data distribution. Therefore, even if the data are not normally distributed, the F-test statistic in ANOVA can still be considered approximately normal in large samples, ensuring reliable results [22].

Table 4. Tests of Normality.

	Kolmogorov-Smirnova			*Shapiro-Wilk*		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
Improve the taste	0.23	339	0.00	0.82	339	0.00
Ensure freshness of ingredients	0.25	339	0.00	0.82	339	0.00
Strengthen food safety supervision	0.35	339	0.00	0.69	339	0.00
Reduced price	0.21	339	0.00	0.85	339	0.00
Rich the variety	0.23	339	0.00	0.84	339	0.00

Guaranteed food safety	0.28	339	0.00	0.87	339	0.00

a. Lilliefors Significance Correction

4.3. Factor Analysis

According to the KMO test and Bartlett's sphericity test, the KMO value was 0.76, indicating that the sample is suitable for factor analysis. Bartlett's sphericity test yielded a significance of 0.00, demonstrating that the correlations between variables are significant and that the correlation matrix is not an identity matrix, thereby meeting the basic requirements for factor analysis. These results confirm that the dataset is appropriate for factor analysis [23].

To further explore the factors influencing consumers' willingness to continue consuming pre-cooked food, Principal Component Analysis with Varimax rotation and Kaiser Normalization was applied to six variables. Two principal components were extracted, which together explained 59.97% of the total variance. The rotated factor loading matrix (Table 5) shows that the first principal component is primarily associated with *enriching categories* (.719), *enhancing taste* (.704), and *reducing price* (.691), reflecting consumers' preferences for product diversity and price perception. The second principal component is mainly associated with *ensuring freshness of ingredients* (.855) and *strengthening food safety supervision* (.785), indicating that consumers place greater emphasis on food safety and quality assurance.

Accordingly, the two principal components can be interpreted as the *Product Perception Dimension* and the *Quality and Safety Dimension*, respectively.

Table 5. Principal-components analysis with Varimax rotation, coefficient alphas, and basic statistics for pre-cooked food.

M	SD	Item	Factor 1 (α=0.5)	Factor 2 (α=0.65)
3.81	1.22	Rich the variety	.719	
3.91	1.16	Improve the taste	.704	
3.80	1.12	Reduced price	.691	
2.97	0.93	Guaranteed the food safety of pre-cooked food	-.616	
4.00	1.09	Ensure freshness of ingredients		.855
4.33	1.01	Strengthen food safety supervision		.785

Factor loadings (α = 0.76, 6 items, n = 339).

4.4. Comparative analysis

4.4.1. Independent T-test

Table 6 presents the results of independent sample t-tests examining gender differences in ratings across five factors. For *improving taste* and *enriching variety*, p-values greater than 0.05 indicate that there are no statistically significant differences between male and female respondents. The mean scores for males are slightly lower than those for females (3.87 vs. 3.93 for taste; 3.69 vs. 3.87 for variety), but the differences are small and not significant.

For *ensuring the freshness of ingredients*, the p-value is less than 0.05, indicating a statistically significant difference between genders. Female respondents rated this factor higher (M = 4.14) than males (M = 3.73), suggesting that women place greater importance on the freshness of pre-cooked food ingredients.

Regarding *strengthening food safety supervision* and *reducing prices*, p-values greater than 0.05 indicate no significant gender differences. The ratings for males and females are similar (4.28 vs. 4.36 for food safety supervision; 3.73 vs. 3.84 for reduced price), showing that both genders assign comparable importance to these factors.

Table 6. Differences between genders in relation to factors.

Factor	Yes/No	Gender	n	M	SD	t	p
Improve the taste	Yes	Male	118	3.87	1.27	-0.447	.655
	No	Female	221	3.93	1.10	-0.428	.669
Ensure freshness of ingredients	Yes	Male	118	3.73	1.17	-3.363	.001
	No	Female	221	4.14	1.02	-3.228	.001
Strengthen food safety supervision	Yes	Male	118	4.28	1.03	-0.712	.477
	No	Female	221	4.36	1.01	-0.707	.480
Reduced price	Yes	Male	118	3.73	1.17	-0.845	.399
	No	Female	221	3.84	1.10	-0.830	.407
Rich the variety	Yes	Male	118	3.69	1.27	-1.249	.212
	No	Female	221	3.87	1.19	-1.225	.222

4.4.2. One-way ANOVA

A one-way ANOVA was conducted to examine the effect of education level on consumers' attitudes toward pre-cooked food across five dimensions: *improve the taste*, *ensure freshness of ingredients*, *strengthen food safety supervision*, *reduce price*, and *rich the variety*.

For *improve the taste*, the effect of education level was not significant, $F(4, 334) = 2.293$, $p = .059$. Although the result approached significance, it did not meet the 0.05 threshold, indicating that education level does not substantially influence this dimension.

A significant effect of education level was observed for *ensure freshness of ingredients*, $F(4, 334) = 2.941$, $p = .021$. Post hoc analyses were conducted to explore potential group differences.

The effect of education level on *strengthen food safety supervision* was not significant, $F(4, 334) = 2.218$, $p = .067$. While close to significance, no meaningful differences were detected between groups.

No significant differences were found in the *reduce price* dimension among education levels, $F(4, 334) = 0.370$, $p = .830$.

A significant effect was found for *rich the variety*, $F(4, 334) = 3.030$, $p = .018$. Post hoc comparisons identified specific group differences, as summarized below.

To further investigate the significant results for *ensure freshness of ingredients* and *rich the variety*, Tukey HSD and Dunnett C post hoc tests were conducted. While ANOVA indicated a significant main effect for *ensure freshness of ingredients*, post hoc comparisons did not reveal any pairwise differences reaching statistical significance at $p < .05$. The closest comparison was between the *high school/technical secondary school* and *junior college* groups (mean difference = -0.599, $p = .079$), which approached significance but did not meet the threshold.

For *rich the variety*, post hoc analysis revealed a significant pairwise difference: respondents with a *master's degree or above* scored significantly higher than those with an *undergraduate course* (mean difference = 0.609, $p = .012$). No other pairwise comparisons were statistically significant.

Table 7. Post Hoc Analysis for Significant Dimensions (Tukey HSD and Dunnett C).

Dimension	Comparison (I-J)	Mean Difference	Std. Error	p
Ensure freshness of ingredients	High school vs. Junior college	-0.60	0.23	0.08
Rich the variety	Master's vs. Undergraduate	0.61*	0.19	0.01

4.4.3. Two-way ANOVA

Levene's test was first conducted to assess the equality of error variances across groups. The null hypothesis states that the variance of the dependent variable is equal between groups. A p-value less than 0.05 would indicate a violation of this assumption.

The results of the two-way ANOVA (Table 8) show that gender has a significant effect on the rating of *"Do you think the safety of pre-cooked food is guaranteed"*, $F = 16.51$, $p < .001$, Partial $\eta^2 = .048$. This indicates that gender accounts for 4.8% of the variance in scores, suggesting a meaningful influence of gender on perceptions of food safety.

Table 8. Two-way ANOVA Based on Gender and Education Level.

Source	Type III Sum of Squares	F	p	η^2
Gender	13.446	16.51	.000	.048
Education level	5.722	1.76	.137	.021
Gender * Education level	10.354	3.18	.014	.037

The effect of education level on ratings was not significant, $F = 1.76$, $p = .137$, Partial $\eta^2 = .021$, indicating no statistically significant differences among respondents with different educational backgrounds.

However, the interaction between gender and education level was significant, $F = 3.18$, $p = .014$, Partial $\eta^2 = .037$. This suggests that the influence of gender on food safety perceptions varies depending on the level of education.

In summary, two-way ANOVA results indicate that gender significantly affects consumers' perceptions of pre-cooked food safety, while education level alone does not. The significant interaction effect demonstrates that the impact of gender may differ across educational levels.

4.4.4. Cluster Analysis

Normality tests showed that the significance levels (Sig.) of both the Kolmogorov-Smirnov and Shapiro-Wilk tests for all variables were 0.00, indicating that all variables significantly deviated from a normal distribution ($p < 0.05$). The Kolmogorov-Smirnov test and Shapiro-Wilk test both rejected the null hypothesis, confirming that the variables do not follow a normal distribution. Therefore, one-way MANOVA could not be applied, and cluster analysis was used for further investigation.

To group consumers based on their willingness to consume pre-cooked food and provide insights for marketing strategies, this study employed the K-means clustering method along with two-step clustering analysis. Ward's method was used to perform clustering based on factors such as consumers' desire to improve taste, reduce price, enrich variety, ensure ingredient freshness, and strengthen food safety. The analysis divided the sample into two clusters, Cluster 1 and Cluster 2 (Table 9), with significant differences in ratings across variables. Cluster 1 included 216 individuals (63.7% of the sample), representing the majority, while Cluster 2 included 123 individuals (36.3%), representing a smaller segment.

Table 9. Ratings of Pre-Cooked Food Consumers by Cluster.

Variable	Cluster 1	Cluster 2
n	216	123
%	63.70	36.30
Rich the variety	4.39	2.78
Strengthen food safety supervision	4.77	3.57
Improve the taste	4.38	3.10
Guaranteed food safety	2.63	3.58
Reduced price	4.14	3.20
Ensure freshness of ingredients	4.29	3.49

Cluster 1: Consumers more concerned with food diversity and safety

Cluster 1 rated *rich variety* highest (4.39) and also placed strong emphasis on *strengthening food safety supervision* (4.77). Attention to *improving taste* (4.38) and *ensuring freshness of ingredients* (4.29) was also high. The rating for *reducing prices* (4.14) indicates that price is moderately important. However, the low score for *guaranteed food safety* (2.63) suggests doubts about the safety of pre-cooked food. Overall, Cluster 1 consumers prioritize food diversity, safety, and freshness, and while price is a consideration, it is not their primary concern. Their relatively lower trust in food safety suggests a strong inclination toward improving food safety and product diversity.

Cluster 2: Price-sensitive consumers with higher trust in food safety

Cluster 2 rated *rich variety* lower (2.78), indicating that diversity is not a key concern. The rating for *strengthening food safety supervision* (3.57) is lower than Cluster 1 but still receives some attention. Ratings for *improving taste* (3.10) and *ensuring freshness of ingredients* (3.49) are moderate. The score for *reducing prices* (3.20) shows that price is somewhat important. Notably, the score for *guaranteed food safety* (3.58) is higher than Cluster 1, suggesting that these consumers have a higher level of trust in pre-cooked food safety.

In summary, Cluster 2 consumers are less concerned with product diversity and more confident in food safety. They exhibit moderate attention to taste, freshness, and price, reflecting a relatively balanced set of consumption preferences.

4.5. Multivariate Test

The regression model significantly predicted the frequency of pre-cooked food purchases, $F(3, 21) = 33.24$, $p < .001$, with $R^2 = .318$. This indicates that 31.8% of the variance in weekly pre-cooked food purchase frequency can be explained by the predictors: education level, occupation, and gender.

Among the predictors, occupation had the strongest positive effect (Beta = .409, $p < .001$), while education level showed a significant negative effect (Beta = -.377, $p < .001$). Gender also had a significant negative effect, though weaker (Beta = -.166, $p = .004$).

The predictive model can be expressed as follows:

Frequency of purchasing pre-cooked food per week = 2.447 + 0.251 × (Occupation) − 0.286 × (Education level) − 0.265 × (Gender)

These results suggest that occupation and education level are key factors influencing consumers' weekly purchase frequency of pre-cooked food, with occupation increasing purchase frequency and higher education levels associated with lower purchase frequency. Gender has a smaller but statistically significant negative effect.

5. Discussion

The results of this study demonstrate that consumer purchasing behavior is influenced by multiple factors, which interact to affect consumers' willingness to purchase pre-cooked food and, consequently, their actual purchasing behavior. Analysis indicates that education level and gender are key factors influencing consumer decisions. Highly

educated consumers tend to have greater awareness of and acceptance toward pre-cooked food. Women, in particular, appear more concerned with food safety and ingredient freshness compared to men. This may be because women traditionally undertake a larger share of household cooking responsibilities and spend more time on food preparation and purchasing, leading to greater attention to these aspects.

Young consumers, women, and employed individuals tend to show higher engagement with pre-cooked food. Young people often choose pre-cooked options to save cooking time due to work or study commitments. Employees with stable incomes are more willing to try new products, while students, as an innovative demographic, also exhibit high acceptance of pre-cooked food. Moreover, consumers who cook at home three or more times per week demonstrate a stronger tendency to purchase pre-cooked food.

Multiple regression analysis of actual purchase behavior revealed that higher education levels are associated with reduced purchase frequency, whereas certain occupations, such as office work, increase purchase frequency. Gender also plays a role, with women purchasing pre-cooked food more frequently than men.

Factor analysis identified two main dimensions influencing consumers' willingness to continue consuming pre-cooked food: the product perception dimension and the quality and safety dimension. Among these, food safety is a primary concern, although consumers' perceptions of safety vary. These factors shape overall attitudes toward pre-cooked food and influence continued consumption behavior. Consumers not only emphasize quality and safety but also consider product perception, such as convenience, speed, and overall eating experience. Preferences for taste, texture, and freshness differ across consumer groups. Notably, residents in third- and fourth-tier cities place greater emphasis on ingredient freshness and are more attentive to taste and cooking processes compared to those in first-tier cities.

6. Conclusion

6.1. Implications for Practice

This study, through multidimensional analysis of consumer perceptions and behaviors, identified food safety, product diversity, and price as key factors influencing consumer choices regarding pre-cooked food. These findings offer valuable insights for marketing strategies in the pre-cooked food industry and provide a foundation for future research on consumer behavior. Food manufacturers should consider consumers' education levels and gender characteristics when developing differentiated product promotion strategies. Marketing efforts should emphasize food safety commitments and provide transparent information about raw materials and processing methods to strengthen consumer trust.

As the market penetration of pre-cooked food continues to expand across both B2B and B2C sectors, and as sales channels improve, consumers are increasingly exposed to pre-cooked food products. Products that align with consumer needs are likely to gain popularity over time, leading to repeat purchases and reinforcing brand image, thereby further influencing purchasing decisions.

Cluster analysis identified two distinct consumer groups with differing needs and characteristics:

Cluster 1: Consumers who value product diversity and food safety. For this group, pre-cooked food companies should prioritize food safety and variety. Increasing product options and enriching menus can meet these consumers' demand for diversity. Enhancing transparency in food safety supervision-such as through traceability systems-can strengthen consumer trust and encourage repeat purchases.

Cluster 2: Consumers who are price-sensitive but exhibit higher trust in food safety. For this group, companies should focus on balancing price and quality. Providing cost-effective products while maintaining food quality and freshness can effectively meet the needs of price-sensitive consumers.

6.2. Implications for Further Research

The rise of social media platforms, including TikTok (Douyin), Xiaohongshu, and Kuaishou, along with the use of big data recommendation algorithms, has significantly influenced public perceptions and attitudes toward pre-cooked food. Viral trends and discussions, including claims suggesting excessive chemical additives, have brought pre-cooked food into the public spotlight, promoting market development but also contributing to misconceptions and consumer resistance.

Future research should explore how social media shapes public attitudes and behaviors, particularly examining how information dissemination through emerging media channels affects consumer perceptions, trust, and purchasing decisions regarding pre-cooked food.

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