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FACTORS INFLUENCING PURCHASE INTENTIONS IN THE PACKAGING DESIGN OF H CATERING COMPANY'S SELF-HEATING HOTPOT

Yuan Lin, WenChao Pan*, Ran Liu, HaiLin Wang
School of Management, Guangzhou University of Chinese Business, Guangzhou 510006, Guangdong, China.
Corresponding Author: WenChao Pa, Email: teacherp0162@126.com

Abstract: To investigate the causal mechanism linking H Catering Company's self-heating hotpot packaging design to consumer purchase intent and enhance product market competitiveness, this study employs empirical research based on 302 valid questionnaire responses, incorporating grey association analysis. Findings reveal that corporate employees aged 41 and above constitute the core consumer demographic, exhibiting highest satisfaction with packaging functionality and practicality, followed by visual elements and material safety. Grey relational analysis further confirmed the ranking of packaging design dimensions influencing purchase intent: functional utility > visual elements > material safety. This indicates functional utility as the core factor in consumer decision-making. Consequently, three-dimensional optimisation recommendations are proposed: Functional Utility Dimension: Design foldable stacking structures, concealed handles, and colour-changing water level indicators for diverse scenarios to enhance operational convenience. For visual elements, establish a differentiated visual system for flavour variations while enhancing information transmission efficiency and emotional resonance. Regarding material safety, upgrade food-grade inner packaging and puncture-resistant outer bags for heating packs, alongside improving safety guarantees for reusable materials to balance security and environmental sustainability. This research provides theoretical and practical references for optimising catering packaging design and boosting purchase intent.
Keywords: Grey relational analysis; Packaging design; Purchase intention

1 INTRODUCTION

Driven by consumption upgrades and accelerated lifestyles, self-heating hotpots have become a new favourite among younger demographics. According to the 2024 Convenience Food Industry Panorama Insight (https://www.fxbaogao.com/report?id=4772878), rising urbanisation rates have heightened demands for premium consumer goods, particularly in major cities where consumers expect greater product diversity and quality.Within the convenient food consumer base, women constitute 55% of the market. This substantial female consumer demographic, particularly dominant in online spending, exerts significant influence over the convenient food sector. Crucially, heightened health consciousness has deepened public emphasis on wholesome diets, compelling the industry to respond by offering more healthful yet convenient options.

Packaging design plays an indispensable role in the convenience food sector, fulfilling fundamental functions of practicality and safety while often exceeding basic requirements. It also serves as a key vehicle for conveying brand philosophy and guiding purchasing decisions, needing to capture consumer attention swiftly. H Catering Company, a major player in the self-heating hotpot segment, possesses flavour advantages but has seen slowing market share growth in recent years. Consumers, confronted with unchanging packaging designs, struggle to develop new or increased purchasing intent.

Therefore, this study examines H Company's self-heating hotpot packaging across three dimensions: visual appeal, functionality, and informational content. Employing questionnaire surveys, literature review, and data analysis, it assesses the extent to which these elements influence consumer purchasing intent. The literature review synthesises theoretical findings on packaging design and consumer purchasing behaviour, establishing the study's theoretical foundation.Questionnaires were employed to gather consumer perceptions of H Company's packaging and purchase intent data, ensuring the objectivity and authenticity of research findings. Data analysis methods were applied to conduct in-depth exploration of survey data, precisely quantifying the impact of each dimension.

2 REVIEW OF RELEVANT RESEARCH LITERATURE

Firstly, during the early rise of convenient self-heating foods, the study Convenient Self-Heating Foods Release Huge Consumer Demand indicated that self-heating foods, represented by self-heating hotpots, achieved annual growth exceeding 20%. Post-80s and Post-90s generations form the primary consumer base, with regional speciality cuisines providing the industrial foundation for market expansion.Industry participants are diverse, with channel integration and innovation emerging as key trends. However, current challenges include limited flavour variety and product homogenisation, necessitating corporate adaptation to market shifts through innovation to overcome developmental bottlenecks [1]. These issues remain critical challenges for the self-heating convenience food sector.

Numerous scholars have identified packaging design as playing a decisive role within the self-heating food sector. In his

systematic study of customer satisfaction, Zhao Baoshan introduced grey relational theory to analyse the influence mechanism of packaging design. By constructing a relational model linking packaging design elements to customer perception and ultimately satisfaction, he quantitatively validated the relative weight of different packaging dimensions on consumer decision-making [2]. Xie Jie focused on the practical and aesthetic values of packaging design, examining their influence on consumer purchasing behaviour through multiple dimensions including historical development, functional classification, positioning design, and sales methods. The study emphasised that these values are mutually reinforcing and interdependent: practicality forms the foundation while aesthetics is indispensable. Overemphasising either is inadvisable, and their integration holds significant importance for modern packaging design, being key to creating outstanding packaging [3] .

Amidst fierce competition in the ready-to-eat convenience food sector, creating differentiated products has become a direct competitive strategy. Such differentiation requires consideration and design across multiple dimensions. Zhang Dalu and Tang Lanling contend that the rise of the singles economy has spurred innovation in Chongqing hotpot packaging, noting current market offerings suffer from homogenisation and lack of individuality.Innovative designs exhibit compactness, convenience, and contemporary styles, while also addressing emotional resonance, social interaction, and personalisation needs. Existing examples include hotpot cups and self-heating hotpot sets, with future development requiring continuous exploration aligned with consumer demands [4]. Deng Wenzhi, Xu Juanfang, and Liu Zhiqi note that self-heating foods have gained traction due to the rise of the stay-at-home economy and single-person households, yet their packaging suffers from homogeneity, weak brand recognition, and issues concerning safety and container design.Taking Chongqing self-heating hotpot as a case study, this article examines the translation and application of regional cultural symbols. By extracting elements from form and structure, it proposes application strategies within and across domains to enhance brand competitiveness, consumer experience, and disseminate regional culture [5].

With societal advancement, increasing enterprises are fulfilling social responsibilities, where green packaging represents a fundamental pathway for promoting circular development. Xiao Mengyun investigated the impact of green packaging cues on consumer purchase intentions through four experiments. Findings revealed that both green food labels and eco-friendly packaging materials positively influence purchase intentions, mediated by perceived functional value and perceived green value, with health and ecological motivations acting as moderators [6]. Li Yan examined the impact of sustainable packaging on health food purchase intentions, testing hypotheses through two online experiments grounded in the halo effect and dual-processing model. Results indicated that packaging sustainability positively influenced purchase intentions, mediated by perceived quality, with health-conscious eating tendencies moderating this effect—consumers exhibiting such tendencies demonstrated higher purchase intentions[7].

This study examines factors influencing purchase intent for H Catering Company's self-heating hotpot packaging design, analysing how different packaging dimensions affect consumer purchasing decisions. Employing grey management degree analysis, it clearly quantifies the correlation between various dimensional factors and purchase intent. Li Tingting focused on housing demands among the elderly in Harbin's ageing population, employing grey relational analysis as the core analytical tool. Its significance lies in the precise selection of six key indicators, incorporating statistical data from 2003 to 2014 to quantify the influence of each factor. This study identified per capita housing floor space as the core influencing factor, providing scientific support for housing demand research and offering critical evidence for government policy formulation and developer planning [8]. Lanshuang addressed the multi-factor and information-impaired nature of packaging design proposals, highlighting the limitations of the Analytic Hierarchy Process and Fuzzy Comprehensive Evaluation Method while underscoring the significance of grey relational analysis. Its approach is characterised by clarity and minimal computational demands. Through steps such as sequence construction and dimensionless transformation, it enables precise ranking of multiple proposals. Validated through beverage packaging case studies, it provides a scientifically reliable analytical tool for optimising packaging design solutions [9]. Liao Chao-xiong focused on factors influencing construction costs, highlighting the core value of grey relational analysis. Suited to engineering scenarios with incomplete information, it enables quantitative assessment of each factor's impact.Using a shantytown redevelopment project as a case study, by constructing models and processing deducted data, it precisely determines the correlation between factors such as design and drawings. This resolves the difficulty of weighting in traditional qualitative analysis, providing scientific and reliable decision support for cost control in government-funded projects [10].

3 RESEARCH METHODOLOGY

3.1 Literature Review Method

Literature review serves as the theoretical foundation, systematically reviewing relevant literature to clarify the core elements of the research framework and variable relationships.The study collected literature using grey relational analysis, packaging design, and purchase intention as core keywords. Through summarising, reviewing, and integrating the literature, the core variables of this research were identified. A theoretical analytical framework was constructed to examine the factors influencing purchase intention in H Catering Company's self-heating hotpot packaging design. Based on this, research hypotheses were proposed, laying the theoretical foundation for subsequent investigations.

3.2 Questionnaire Survey Method

Through the collection of questionnaires, data regarding consumers' perceived evaluations of H Catering Company's self-heating hotpot packaging and their purchasing intentions were gathered, ensuring the objectivity and generalisability of the research conclusions. The questionnaire comprised three sections: basic sample information, core variable measurement items, and open-ended questions. Distributed via online channels, 302 valid responses were collected, meeting the statistical analysis requirements for empirical research.This dataset comprehensively covers key research information including consumer characteristics, packaging perceptions, and consumption tendencies. It provides robust and reliable data support for subsequent grey correlation analysis, exploring the strength of associations between various packaging design dimensions and purchase intent, and formulating targeted optimisation recommendations.

3.3 Data Analysis Methods

This study primarily employed descriptive analysis and grey correlation analysis, utilising SPSS 26.0 statistical software for data processing.

Descriptive analysis was employed to organise fundamental sample information, including gender and age distribution statistics, thereby verifying sample representativeness. For measurement items concerning packaging design dimensions and purchase intent, metrics such as means and frequencies were calculated. This enabled intuitive presentation of consumers' perceived levels regarding various elements of H Catering Company's self-heating hotpot packaging and the intensity of their purchase intent. Sample representativeness was further validated by benchmarking against target consumer group characteristics.For measurement items and purchase intention questions across dimensions including packaging functionality, visual elements, and material safety, data was presented through charts combined with text. This visually demonstrated consumer perception differences, overall evaluation levels, and purchase intention strength for each packaging element, establishing a robust data foundation for subsequent in-depth investigations such as grey correlation analysis.

Grey correlation analysis, abbreviated as grey correlation, refers to the uncertain relationships between phenomena or between systemic factors and primary behaviours. When employing grey correlation analysis for comprehensive design evaluation, one must first establish reference sequences and comparison sequences. Subsequently, the importance of various influencing factors or alternative proposals is determined by calculating the correlation coefficients and degrees of association between comparison sequences and reference sequences. Finally, alternative proposals can be ranked according to their relative merits based on the magnitude of their association degrees.Grey Relational Analysis addresses the fuzzy characteristics of influence relationships between consumer perceptions and purchase intentions. It quantifies the degree of association between various dimensions of H Catering Company's self-heating hotpot packaging design and consumer purchase intentions. By ranking these dimensions according to their degree of association, it clarifies the primary and secondary order of influence on purchase intentions, providing a reference basis for optimising the packaging design.

4 DESCRIPTIVE STATISTICAL ANALYSIS

4.1 Gender Descriptive Statistics

The consumer experience survey regarding factors influencing purchase intent for H Catering Company's self-heating hotpot packaging design yielded 302 valid questionnaires. Statistical results for the gender variable indicate the sample distribution possesses good representativeness.Specifically, female consumers numbered 144, accounting for 47.7% of the total sample; male consumers numbered 158, accounting for 53.2% of the total sample. No samples lacked gender information. In terms of distribution characteristics, the proportion of male samples was slightly higher than that of female samples, consistent with the characteristic that male groups are more inclined to consume self-heating hotpot products in H Catering Company's actual consumption scenarios. As shown in Table 1.

Table 1 Descriptive Statistics Analysis by Gender

Your Gender				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Male	158	52.3	52.3	52.3
ValidFemale	144	47.7	47.7	100.0
Total	302	100.0	100.0	

4.2 Age Descriptive Statistics

The age data statistics are as follows: those aged 41 and above account for 28.1%, followed by the 18-23 age group at 26.5%, the 24-30 age group at 25.5%, and the 31-40 age group at the lowest proportion, 19.9%.No samples lacked age information. In terms of distribution characteristics, the 41 and above age group was the largest, followed by the younger 18-23 age group. As shown in Table 2.

Table 2 Descriptive Statistics for Age

Your age

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	18–23 years	80	26.5	26.5	26.5
	24–30 years old	77	25.5	25.5	52.0
	31–40 years old	60	19.9	19.9	71.9
	41 years and above	85	28.1	28.1	100.0
	Total	302	100.0	100.0	

4.3 Occupational Descriptive Statistical Analysis

Occupational data statistics are as follows: students (17 cases, 5.6%); self-employed individuals (39 cases, 12.9%); government employees (21 cases, 7%); corporate employees (201 cases, 66.6%); medical institution staff (13 cases, 4.3%); and educational institution personnel (11 cases, 3.6%).The data indicates that corporate employees constitute the largest proportion, with 201 samples, suggesting greater willingness among this group to consume self-heating packaged instant products. Occupations within educational institutions represent a smaller proportion. As shown in Table 3.

Table 3 Descriptive Statistical Analysis by Occupation

Your Occupation					
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Student	17	5.6	5.6	5.6
	Self-employed	39	12.9	12.9	18.5
	Government employees	21	7.0	7.0	25.5
	Corporate staff	201	66.6	66.6	92.1
	Medical institution staff	13	4.3	4.3	96.4
	Educational Institution Occupations	11	3.6	3.6	100.0
	Total	302	100.0	100.0	

4.4 Descriptive Statistics Analysis of Educational Attainment

The educational attainment distribution is as follows: 55 individuals (18.2%) possess secondary education or below; 110 individuals (36.4%) hold a college diploma; 105 individuals (34.8%) hold a bachelor's degree; 32 individuals (10.6%) hold a master's degree or higher; no samples lacked educational attainment information.The distribution characteristics indicate that the sample predominantly comprises individuals with college or undergraduate qualifications. This aligns closely with the educational profile of H Catering Company's core consumer base (young and middle-aged working professionals with a certain level of purchasing power). Coverage across all educational levels demonstrates that the sample possesses broad representativeness in terms of educational attainment. This supports subsequent analyses examining consumption experience differences and correlations among consumers with varying educational backgrounds. As shown in Table 4.

Table 4 Descriptive Statistics Analysis of Educational Attainment

Your Educational Attainment					
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Secondary education and below	55	18.2	18.2	18.2
	Technical college	110	36.4	36.4	54.6
	Undergraduate	105	34.8	34.8	89.4
	Master's degree and above	32	10.6	10.6	100.0
	Total	302	100.0	100.0	

4.5 Descriptive Statistics Analysis of Purchase Frequency

Statistical analysis of purchasing frequency for H Catering Company's Natural Hotpot reveals: Very Frequent (7+ times monthly) – 73 respondents (24.2%); Fairly Frequent (4–6 times monthly) – 67 respondents (22.2%); Moderate Frequency (2–3 times monthly) – 83 respondents (27.5%); Less Frequent (1 time monthly or less) – 79 respondents (26.2%). No missing data for this question.The distribution reveals that the combined proportion of very frequent and fairly frequent purchases stands at 46.4%, yet monthly frequency of once or less ranks second. This indicates room for improvement in marketing strategies concerning repeat purchases. As shown in Table 5.

Table 5 Descriptive Statistics Analysis of Purchase Frequency

Have you ever purchased Haidilao self-heating hotpot?					
		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	Very Frequent (7 times or more per month)	73	24.2	24.2	24.2
	Fairly frequent (4–6 times per month)	67	22.2	22.2	46.4
	Moderate (2-3 times per month)	83	27.5	27.5	73.8
	Less frequently (once or less per month)	79	26.2	26.2	100.0
	Total	302	100.0	100.0	

5 GREY CORRELATION ANALYSIS

5.1 Raw Data Phase

This stage collected core data from 302 valid samples, with primary indicators comprising raw scores for visual design, functional utility, and packaging design. The data covered diverse product attribute evaluation scenarios, featuring sufficient sample size and balanced distribution. It comprehensively documented initial feedback for each indicator, providing authentic and reliable foundational data for subsequent grey correlation analysis. As shown in Table 6.

Table 6 Evaluation Indicator System for Primary Headings

Primary Indicator	Mean	Standard Value	Minimum	Maximum Value
Packaging Safety	3.82	0.7688	1.00	5.00
Visual Design	3.8055	0.7373	1.25	5.00
Functional Utility	3.7960	0.7300	1.20	5.00

5.2 No-Volume Hardening Phase

To eliminate interference arising from dimensional differences between indicators, the raw data underwent standardised conversion. This ensured comparability between purchase intent and primary indicator values, preventing analytical bias from differing measurement methodologies and clearing data obstacles for subsequent variance calculations and correlation analysis. As shown in Table 7.

Table 7 Standardised Indicator System for Primary Headings

Primary Indicator	Mean	Standard Value	Minimum	Maximum Value
Packaging Safety	1.9117	0.3844	0.500	2.500
Visual Design	1.9027	0.3687	0.625	2.500
Functional Utility	1.8980	0.3650	0.600	2.500

5.3 Differential Sequence Stage

The mean values of the differential sequences for each indicator range between 0.211 and 0.217, indicating minimal variation. The maximum and minimum values are presented in Table 8.

Table 8 Evaluation Indicator System for Primary Headings

Influencing Factors	MAX	MIN
Functional Utility	0.7	0
Visual Elements	0.8	0
Material Safety	0.8	0

5.4 Correlation Coefficient Stage

This study, based on 302 valid questionnaire responses, employed grey relational analysis with purchase intent as the reference sequence (X_0) and visual design (X_1), functional utility (X_2), and material safety (X_3) as comparative sequences. Key findings are summarised as follows:Firstly, the correlation rankings between each influencing factor dimension and purchase intent are: functional utility (r_1=0.6965) > visual design (r_2=0.6925) > material safety (r_3=0.6910).Secondly, packaging functionality exhibits the strongest correlation with purchase intent, indicating that H Catering's consumers are primarily influenced by functional utility. Although material safety displays the weakest correlation, it remains a significant factor affecting purchase intent. Thirdly, the sample size of 302 respondents is deemed sufficient and evenly distributed, ensuring robust stability in the correlation analysis results.In summary, this grey correlation analysis clarifies the weighting of each influencing factor dimension on purchase intent. It provides targeted decision-making support for H Catering to optimise purchase intent drivers and enhance consumer spending, while also laying the groundwork for subsequent differential correlation analyses across segmented groups (e.g., different genders, educational backgrounds). As shown in Table 9.

Table 9 Level-1 Indicator System for Price-to-Quality Ratio

Primary Indicator	Correlation	Standard Value	Minimum Value	Maximum Value
Packaging Safety	0.6910	0.1718	0.3333	1.0000
Visual Design	0.6925	0.1649	0.3333	1.0000
Functional Utility	0.6965	0.1718	0.3333	1.0000

6 CONCLUSION

The data indicates a positive correlation between functional packaging design and consumer purchase intent. Respondents who rated packaging functionality more highly demonstrated relatively stronger purchase intent.Furthermore, while packaging aesthetics were not prominently featured in the initial questionnaire options, some

respondents mentioned in supplementary feedback that visually appealing packaging enhances product appeal, indirectly influencing purchasing decisions. Additionally, material safety is an integral aspect of consumer purchasing intent, representing an underlying customer requirement. Consequently, optimisation across these three dimensions is necessary to ensure alignment with evolving consumer demands.

Regarding functional utility, maintaining packaging strengths in portable storage, sealing performance, operational convenience, and clear usage instructions remains fundamental to sustaining consumer goodwill and purchase intent. Simultaneously, differentiated functional designs can be developed for distinct scenarios. For home storage, adding foldable clips to the packaging sides enables stable stacking without tipping when multiple boxes are piled.For travel scenarios, optimise the folding structure to reduce packaging thickness and incorporate a concealed handle at the top for easy insertion into backpack side pockets. For office meal replacement scenarios, add heat-insulating silicone strips to the exterior of heating containers to prevent heat damage to surfaces, alongside small condiment pouch compartments to prevent sauce spillage.Precise water-level markings are indicated on the heating pack's reaction zone, complemented by a colour-changing indicator strip that activates when the water level is correct, resolving issues of over- or under-filling. Anti-slip textures are added to the tear-open tabs of vegetable and seasoning packets, enhancing ease of opening and accommodating scenarios involving shorter nails or damp hands.

Visually, differentiated colour schemes distinguish flavours: fiery red-orange gradients with flame motifs for spicy varieties, and warm yellow gradients with tomato textures for tomato-based options. This aids rapid flavour identification, reducing uncertainty and purchase hesitation. Core selling points—such as 15-minute preparation and no-dishwashing convenience—feature prominently on packaging fronts to align with fast-paced consumers' decision-making needs.Furthermore, the inner packaging features engaging content like hotpot trivia to foster emotional connection with consumers. Catering to younger tastes, minimalist design is adopted, reducing intricate patterns to enhance brand sophistication.

Regarding material safety, the inner food packaging employs food-grade materials that are heat-resistant and microwave-safe, accommodating consumers who reheat meals. The outer heating pouch uses reinforced, puncture-resistant composite film with a damage-indicator colour strip. Should the packaging rupture, the strip turns blue, providing an immediate safety alert to prevent accidents.For consumers who enjoy collecting and repurposing items, we enhance reuse functionality by upgrading the outer box into a detachable storage container. After consumption, removing the heating components transforms it into a snack storage box. Upon product completion, recycling guidelines for materials are printed on the inner packaging, guiding consumers in proper disposal.

Therefore, marketing efforts targeting safety and trust concerns, based on confirmed information dimensions, are crucial for securing consumer confidence. Clearly communicating safety information alleviates consumer apprehensions. Only through the organic integration of these three elements can marketing optimisation precisely align research conclusions with consumer demands, maximise marketing value, and drive improved product market performance.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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