



Enhancing the Brand Competitiveness of Pujiang Kiwi: A Consumer-Centric Analysis

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Abstract. The entropy method is an objective technique for weighting indicators in multi-criteria decision-making, based on information uncertainty. When data shows low variation, entropy is low, indicating high information content. High variation leads to high entropy, reflecting lower information content. By calculating the coefficient of variation and information entropy, the method determines each indicator's weight objectively, reducing subjectivity and enhancing the accuracy and reliability of evaluations.

Keywords: Pujiang Kiwi; Brand Competitiveness; Consumer.

1 Introduction

As one of the world's largest agricultural producers, China views agricultural development as central to its national strategy. Agriculture is a key economic pillar and a driver of modernization and rural revitalization. With ongoing agricultural reforms, branding has become vital for enhancing market competitiveness, ensuring product quality, building consumer trust, and promoting local economic development.

In 2005, the Central Document No. 1 introduced "agricultural product branding," emphasizing the integration of quality products to boost agricultural competitiveness. President Xi Jinping has highlighted the importance of branding, aiming to transform "Made in China" into "Created in China" and "Chinese Products" into "Chinese Brands." Several policies have since been introduced to promote regional agricultural brands and standardize production.

Pujiang County, located on the Chengdu Plain, has a favorable climate and fertile soil for agricultural production. The region has developed distinct agricultural brands, with "Pujiang Kiwi" leading the way. With a long cultivation history, high-quality fruit, and strong market recognition, Pujiang Kiwi is a key brand in China. In 2023, it ranked among the top 100 Chinese brands with a value of 13.02 billion yuan. Despite these achievements, the brand still faces challenges, such as limited consumer insight, shallow recognition, and suboptimal market promotion strategies. Therefore, studying the brand's competitiveness and exploring optimization paths are crucial.

2 Research Methods and Process

2.1 Establishing the Indicator System

Recent studies highlight the importance of a scientific evaluation system for assessing regional brand competitiveness. Yu (2020) ^[1] examined strategies for regional public brand development, focusing on product strength, market strength, cultural strength, and customer relationships. Xu (2022) ^[2] explored the impact of consumer behavior on agricultural branding, emphasizing product quality and customer experience. Han et al. (2022) ^[3] analyzed the role of customer perceived value in brand strategy, proposing ways to enhance competitiveness through improved product and service value. Hekkert et al. (2021) ^[4] discussed the importance of brand culture and customer service in sustainable markets. Liu et al. (2022) ^[5] highlighted the role of e-commerce platforms in promoting agricultural branding, drawing on international experiences. Spilioti et al (2023) ^[6] emphasized the role of brand building in shaping regional identity. These studies provide theoretical and empirical support for the indicator system developed in this paper.

In conclusion, combining consumer value theory, customer perception theory, and public goods theory, as well as considering practical needs and recent research on regional brand competitiveness, an evaluation indicator system for "Pujiang Kiwi" was established. The first-level indicators include: Brand Product Strength (M1), Brand Market Strength (M2), Brand Cultural Strength (M3), and Customer Relationship Strength (M4). Corresponding second-level indicators include: under Brand Product Strength, Product Quality (M11), Product Innovation (M12), Product Packaging (M13); under Brand Market Strength, Product Price (M21), Sales Channels (M22), Brand Promotion (M23); under Brand Cultural Strength, Brand Reputation (M31), Brand Loyalty (M32), Brand Cultural Connotation (M33); under Customer Relationship Strength, Customer Service Quality (M41), Customer Experience (M42). Each second-level indicator has corresponding explanatory indicators, totaling 32 detailed explanatory indicators.

2.2 Questionnaire Design and Data Analysis

A questionnaire containing the first-level and second-level indicators was designed to survey consumers who have purchased Pujiang Kiwi. The Likert five-point scale was used to assess the satisfaction level of each indicator, with five levels: "Very Dissatisfied," "Dissatisfied," "Neutral," "Satisfied," and "Very Satisfied." The survey was distributed both online and offline, mainly with the help of family, friends, classmates, and teachers. The target respondents were consumers of Pujiang Kiwi, aiming to gain a comprehensive understanding of their satisfaction with the product's indicators and provide data support for brand development. A total of 500 questionnaires were distributed, with 478 valid responses, resulting in an effective response rate of 95.6%. SPSS 21.0 was used to analyze the validity and reliability of the data, and the results passed the validity and reliability tests

2.3 Entropy Method for Determining Indicator Weights

The entropy method is an objective weighting technique used in multi-criteria evaluation and decision-making. It assigns weights based on information uncertainty. When data is concentrated with low variation, information is high, and entropy is low. Conversely, when data varies greatly, information is low, and entropy is high. By calculating the coefficient of variation and information entropy, the method determines the weight of each indicator objectively, minimizing subjective bias and enhancing evaluation accuracy and scientific rigor

(1) Standardization processing formula:

$$S_{ij} = \frac{s_{ij} - \min(s_{ij})}{\max(s_{ij}) - \min(s_{ij})} \quad (1)$$

(2) Translating the standardized values:

$$S_{ij} = \frac{s_{ij} - \min(s_{ij})}{\max(s_{ij}) - \min(s_{ij})} + 0.00001 \quad (2)$$

(3) Calculating the variation size of each indicator:

$$P_{ij} = \frac{S_{ij}}{\sum_{i=q}^a S_{ij}} \quad (3)$$

(4) Calculating the entropy value of the indicators:

$$e_j = -\frac{1}{\ln(n)} \sum_{i=1}^n p_{ij} \ln(p_{ij}) \quad (4)$$

(5) Calculating the coefficient of variation:

$$g_j = 1 - e_j, j = 1, 2, \dots, p \quad (5)$$

(6) Calculating the weights of the indicators after normalization:

$$w_j = \frac{g_j}{\sum_{j=1}^p g_j} \quad (6)$$

2.4 Fuzzy Comprehensive Evaluation Method for Calculating Indicator Scores

The evaluation factors are based on the evaluation indicator system for the "Pu jiang Kiwi" brand competitiveness, divided into four first-level indicators: M = (M1, M2, M3, M4). Each first-level indicator has corresponding second-level indicators, with detailed evaluation standards, forming a comprehensive evaluation framework for "Pujiang Kiwi" brand competitiveness.

Using a 3 to 5-level evaluation scale with a percentage system, the competitiveness of the "Pujiang Kiwi" brand is evaluated on a five-level scale, ranging from "Excellent" to "Very Poor."

The evaluation results for each level and indicator score are calculated and analyzed using matrices and vectors.

Based on the research practice of geographical indication agricultural product brand competitiveness, evaluation levels are typically set from 3 to 5, quantified using a percentage system. This study draws on the research of scholars such as Li Fuhua (2012), Yao Chunling (2014), and Geng Yijun (2021), setting the evaluation levels for the "Pujiang Kiwi" brand competitiveness as "Excellent," "Good," "Average," "Poor," and "Very Poor," corresponding to the five levels of the Likert scale: "Very Satisfied," "Satisfied," "Neutral," "Dissatisfied," and "Very Dissatisfied." The specific classification is as follows: 100 points for "Excellent," 85-100 points for "Good," 70-85 points for "Average," 60-70 points for "Poor," and below 60 points for "Very Poor." Therefore, the evaluation level set for the "Pujiang Kiwi" brand competitiveness is: $B = \{100, 85, 70, 60, 50\}$.

(1) Establishment of the Explanatory Indicator Evaluation Matrix

Let K evaluators choose the q th level for the explanatory indicator M_{ijk} , and the number of evaluators choosing this level be H_{ijkq} . The probability of evaluators selecting level q is given by:

$$R_{ijkq} = \frac{h_{ijkq}}{K} \quad (7)$$

On this basis, the evaluation results for the indicator M_{ijk} can be represented by a matrix, which summarizes the choices of all evaluators for different levels. This evaluation result matrix is:

$$R_{ijk} = (r_{ijk1} \ r_{ijk2} \ \dots \ r_{ijkQ}) \quad (8)$$

From this, the evaluation matrix R_{ijk} for each explanatory indicator M_{ijk} is obtained:

$$\begin{aligned} R_{111} &= [43/478, 88/478, 94/478, 153/478, 100/478] \\ &= [0.0899, 0.1841, 0.1962, 0.3205, 0.2092] \end{aligned} \quad (9)$$

Similarly, the evaluation matrices R_{112} to R_{423} are determined.

(2) Evaluation Matrix R_{ij} for the Second-Level Indicator M_{ij} :

$$R_{ij} = \begin{pmatrix} R_{ij1} \\ R_{ij2} \\ \dots \\ R_{ijk} \end{pmatrix} = \begin{pmatrix} R_{ij11} & R_{ij12} & \dots & R_{ij15} \\ R_{ij21} & R_{ij22} & \dots & R_{ij25} \\ \dots & \dots & \dots & \dots \\ R_{ijk1} & R_{ijk2} & \dots & R_{ijk5} \end{pmatrix} \quad (10)$$

(3) Evaluation Vector B_{ij} for the Second-Level Indicator M_{ij} :

$$B_{Mij} = W_{ij} * R_{ij} \quad (11)$$

(4) Determining the Evaluation Matrix R_i for the First-Level Indicator M_i :

$$R_i = \begin{pmatrix} B_{Mi1} \\ B_{Mi2} \\ \dots \\ B_{Mij} \end{pmatrix} \tag{12}$$

(5) Determining the Evaluation Vector W_i for the First-Level Indicator M_i :

$$B_{Mi} = W_i * R_i \tag{13}$$

(6) Determining the Evaluation Vector B for the Goal Layer:

$$R = \begin{pmatrix} B_{M1} \\ B_{M2} \\ B_{M3} \\ B_{M4} \end{pmatrix} = \begin{pmatrix} 0.1016 & 0.1978 & 0.1963 & 0.2686 & 0.2357 \\ 0.0959 & 0.2000 & 0.1951 & 0.2554 & 0.2505 \\ 0.0979 & 0.1997 & 0.2002 & 0.2528 & 0.2492 \\ 0.0969 & 0.1998 & 0.2035 & 0.2531 & 0.2472 \end{pmatrix} \tag{14}$$

(7) Determining the Evaluation Vector B for the Goal Layer:

$$B = W * R = (0.0982, 0.1993, 0.1984, 0.2579, 0.2448) \tag{15}$$

(8) Calculating the Evaluation Score F:

Total score:

$$F = B * V \tag{16}$$

First-level indicator score:

$$F_{Mi} = B_{Mi} * V \tag{17}$$

Second-level indicator score:

$$F_{Mij} = B_{Mij} * V \tag{18}$$

Explanatory indicator score:

$$F_{Mijk} = B_{Mijk} * V \tag{19}$$

Based on the above formulas, the scores for each level of indicators are calculated, as shown in the following table 1:

Table 1. Score of each indicator.

Primary Indicator	Score	Secondary Indicator	Score
Brand Product Power (M ₁)	76.82	Product Quality (M ₁₁)	76.63
		Product Innovation (M ₁₂)	77.29
		Product Packaging (M ₁₃)	76.61
		Product Price (M ₂₁)	77.04
Brand Market Power (M ₂)	76.35	Sales Channel (M ₂₂)	75.96
		Brand Promotion (M ₂₃)	76.19
		Brand Reputation (M ₃₁)	76.18

Brand Culture (M ₃)		Brand Loyalty (M ₃₂)	75.80
		Culture Connotation (M ₃₃)	75.14
Customer Relationship (M ₄)	76.83	Client Server Quality (M ₄₁)	76.41
		Customer Experience (M ₄₂)	77.24

2.5 Analysis of Indicator Score Situation

Based on the comprehensive analysis of the indicator scores, the competitiveness of the Pujiang kiwifruit brand stands out in product strength and customer relationship strength, while market strength and brand cultural strength are relatively weak. The brand excels in product quality and innovation, particularly in taste and nutritional value, though there is room for improvement in storage stability and supply chain management. Customer relationship strength scores the highest, reflecting the brand's strong competitiveness in customer service and experience, especially in problem resolution and delivering quality experiences. However, the brand's market strength is relatively low. Despite a solid pricing strategy, there is a mismatch between price and quality, and the sales channels' coverage and convenience are limited, restricting market penetration. Brand cultural strength scores the lowest, indicating deficiencies in cultural development and consumer recognition, with a need to strengthen loyalty and cultural content cultivation.

In conclusion, while the Pujiang kiwifruit brand has advantages in product quality and customer service, further improvement is needed in market promotion, sales channels, and brand cultural development.

3 Recommendations and Conclusion

Pujiang kiwifruit brand should expand both online and offline channels to increase brand awareness and sales. Online, the brand should invest more in e-commerce platforms, using social media and digital marketing tools, and partner with major platforms to establish official flagship stores. Offline, it should strengthen collaborations with supermarkets and wholesale markets, especially in first-tier cities, and expand into second- and third-tier cities and rural areas.

For brand promotion, the brand should focus on creative marketing, leveraging successful strategies and multi-channel distribution to highlight key selling points and enhance consumer engagement. Interactive activities on social media should be held to boost brand exposure and loyalty.

Additionally, the brand should strengthen cultural development by exploring the historical and cultural aspects of kiwifruit and creating a unique local brand story. This can be done through packaging, websites, and social media, and by launching cultural tourism projects to increase brand appeal.

Finally, the brand should engage in social responsibility initiatives, such as supporting environmental protection and charitable projects in impoverished areas, to improve its brand image and consumer loyalty.

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