Analysis of Brand Expectations for Chinese Natural Dyes Based on the Kano Model

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Abstract

This study aims to apply the Kano model to deeply analyze consumers' psychological expectations, optimize the brand image to create traditional and modern designs to meet consumer expectations better and utilize new knowledge to develop a series of innovative natural dye product designs. The sample consisted of 350 consumers selected through purposive sampling, and data were collected using in-depth interviews and focus groups, analyzed with descriptive statistics and content analysis. The findings reveal that consumers have multi-layered psychological expectations for natural dye brands, encompassing respect for traditional culture, support for environmental concepts, and a pursuit of fashionable design. Based on the Kano model, the brand design and development process can accurately capture and fulfill diverse consumer expectations, with up to 90% of experts and respondents agreeing with this brand positioning. The innovative natural dye products developed using new knowledge successfully integrate traditional craftsmanship with modern fashion innovation, particularly rekindling interest in conventional natural dyes among young consumers. This study provides theoretical support for brand design and development and offers practical

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implications for protecting and transmitting traditional crafts and market transformation, contributing significantly to societal value.

Keywords: Analysis of Brain Expectation; Chinese Natural Dyes; Kano Model

1. Introduction

Cultural exchange has become more prominent with the increasing focus on the natural environment and pursuing a green, healthy lifestyle. Within China's inventory of intangible cultural heritage representative projects, traditional crafts account for 629 items. Yet, traditional printing and dyeing techniques comprise only 14 items a modest proportion for a country with such a rich textile history. Natural dyes in China have a long-standing history, characterized by using plant-based materials like indigo, madder, and safflower. These dyes are environmentally friendly and imbued with cultural and historical significance, reflecting the unique aesthetic values and traditions of various Chinese ethnic groups (2022). Despite the potential of natural dyes, there is a significant research gap in understanding how these traditional techniques can be innovatively integrated with modern fashion to meet contemporary consumer expectations. Specifically, applying the Kano model to analyze and optimize brand positioning and product design for natural dye brands remains relatively unexplored (2020). This study addresses this gap by applying the Kano model to deeply analyze consumer expectations and guide the development of natural dye products that balance tradition and modernity (Gwozdz et al., 2017).

The Kano model, proposed by Japanese scholar Professor Noriaki Kano in 1984, is a qualitative analysis tool used to describe the relationship between product functional attributes and user acceptance levels. It

addresses the quantification of ambiguous user needs. Uncovering various user requirements levels for the target product functions clarifies key design directions and develops purpose-driven products, enhancing user loyalty (Zhao & Roy, 2009).

Fig 1: Kano Model

In practical application, the focus is primarily on exploring the Must-be, One-dimensional, and Attractive Quality of a product, which corresponds to essential, expected, and exciting customer needs. The quality requirements for Indifferent Quality and Reverse Quality can be disregarded (Rabaiei et al., 2021). (Fig 1)

To determine the value and significance of product quality requirements, each functional requirement is assessed using both positive and negative framing questions, specifically "having (meeting) a particular functional requirement" or "not having (failing to meet) a particular functional requirement." Each question includes five different satisfaction levels: Must, Like, Indifferent, Accept Reluctantly, and Detest, to test various user reactions (Table 1) (2022).

Table 1: Kano Form of Kano questionnaire

Problem setting	Problem content				
Forward problem	What do you think about when the product has a specific feature?				
	Must ☐	Like ☐	Indifferent ☐	Accept reluctantly ☐	Detest ☐
Inverse problem	What do you think when the product doesn't have a particular feature?				
	Must ☐	Like ☐	Indifferent ☐	Accept reluctantly ☐	Detest ☐

Product innovation is a process of fulfilling multiple demand attributes. Different demands may fall within the exact functional identification in the Kano model. Multiple demands can be prioritized and ranked by calculating the customer satisfaction coefficient. Thus, the Kano model analyzes brand expectations for Chinese natural dyes. Optimizing brand design through the Kano model enhances the brand's competitiveness, achieving innovation and differentiation in product development and market positioning.

2. Research Objectives

Apply the Kano model to deeply analyze consumers' psychological expectations; create both traditional and modern designs by optimizing the brand image to better meet consumer expectations; and utilize new knowledge to develop a series of innovative natural dye product designs.

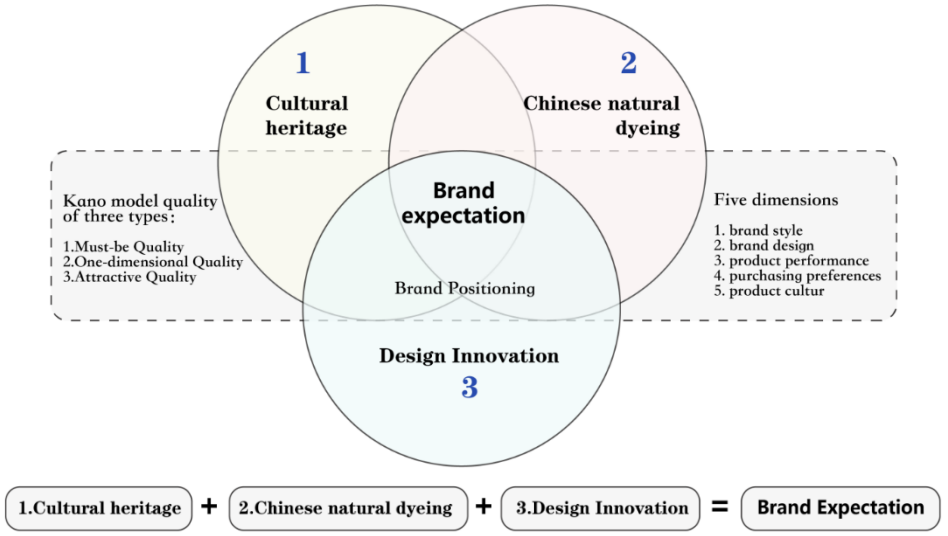

Fig 2: Conceptual Framework

3. Research Methodology

This study employed a mixed-method approach, combining qualitative and quantitative research (Mukendi et al., 2020). The qualitative research involved a four-year longitudinal study of natural dye research and education professionals, specifically Yan Can, Zou Liulan, and Yin Jing(2014). For the quantitative research, surveys were conducted among consumers of varying genders, ages, educational backgrounds, occupations, and income levels, focusing primarily on those working in natural dyeing. The aim was to more precisely position the demands for natural dye brands related to cultural exhibitions and dissemination. The study accurately positioned the brand across five demand dimensions by applying the Kano model to survey data from 350 participants and integrating the Better-Worse coefficient and Quadrant Analysis method. This approach allowed for a comprehensive understanding and evaluation of the brand image from various perspectives, enabling an in-depth analysis to identify user expectations accurately.

4. Research Results

Table 2: Population and sampling

	DEMOGRAPHIC PROFILE	FREQUENCY n=350	PERCENTAGE
Age	35 years old and below	195	55.6
	36 -45 years old	155	44.4
Gender	Male	293	83.8
	Female	57	16.2
Educational	Basic education	68	19.3
	Bachelor	225	64.3
	Master	37	16.5
Income	<10000 RMB	101	28.8
	10000-30000 RMB	234	66.9
	>30000 RMB	15	4.3
Occupation	Blue collar	81	23.1
	White collar	212	60.7
	Elite	57	16.2

Data collection: This questionnaire consists of three parts. The first part is a primary situation survey of 350 participants. The questionnaire is divided into five dimensions. The five dimensions are Strongly Approval, Neutral, Disapproval, and Strongly Disapproval. The second part is the opinions of 350 participants on the primary situation survey of brand style, brand design, product performance, purchasing preferences, and product culture. (Table 2)

Table 3: Kano questionnaire

Problem setting	Direct problem				
$\bar{x}$	Must	Like	Indifferent	Dislike	Detest
1	Q	A	A	A	O
2	R	I	I	I	M
3	R	I	I	I	M

4	R	I	I	I	M
5	R	R	R	R	Q
Total	R	I	I	I	M
3.33	4.0	3.0	3.0	3.0	3.0

In the problem-solving process of design, the Kano model classifies product features based on their perceived importance into five major categories: Must-Be Quality (M), One-Dimensional Quality (O), Attractive Quality (A), Indifferent Quality (I), and Reverse Quality (R). Each quality requirement category has some correlation with user satisfaction. The user experience of quality requirements is the basis for categorizing product functions. To clarify the analysis results of user quality needs in the early design stages, the Kano model employs a more detailed dual-factor questionnaire comparison chart. This matrix, constructed from each function's positive and negative questions, represents the user's perception. (Table 3)

Product innovation is the process of realizing multiple attribute requirements. Different needs may be classified within the same feature identification in the Kano model. Multiple requirements can be prioritized and ranked by calculating the customer satisfaction coefficient (2013).

Statistics and Classification of Different Types of Expectations

According to the evaluation process of the Kano model, each indicator in the questionnaire is set with both a positive and a negative question. Due to the variability of needs in product design among different individuals and because the satisfaction evaluation of the same need may differ due to objective factors such as cultural background, the traditional Kano evaluation method categorizes attributes based on the attribute with the maximum proportion, which has certain limitations. However, this study uses the Better-Worse parameters as the basis for distinguishing the categories of indicator needs.

Table 4: Statistics and Classification of Different Types of Expectations

	Attractive Expectations A	Basic Expectations M	Performance Expectations O	Indifferent Expectations I	Reverse Expectations R	Questionable Results Q	Better Value	Worse Value	Better-Worse Classification
A1	32	13	9	71	2	0	0.328	0.176	Basic Expectations
A2	35	11	8	70	2	1	0.347	0.153	Indifferent Expectations
A3	32	12	11	70	1	1	0.344	0.184	Basic Expectations
A4	34	20	10	62	1	0	0.349	0.238	Performance Expectations
A5	36	10	9	69	3	0	0.363	0.153	Attractive Expectations
A6	45	8	5	66	2	1	0.403	0.105	Attractive Expectations
A7	46	9	12	57	3	0	0.468	0.169	Performance Expectations
B8	29	16	10	69	3	0	0.315	0.210	Basic Expectations
B9	26	14	13	72	1	1	0.312	0.216	Basic Expectations
B10	24	20	6	77	0	0	0.236	0.205	Basic Expectations
B11	34	11	12	65	4	1	0.377	0.189	Performance Expectations
B12	27	20	5	74	1	0	0.254	0.198	Basic Expectations
B13	34	18	4	67	4	0	0.309	0.179	Basic Expectations
C14	36	13	14	62	2	0	0.400	0.216	Performance Expectations
C15	37	8	11	70	1	0	0.381	0.151	Attractive Expectations
C16	41	10	6	70	0	0	0.370	0.126	Attractive Expectations

C17	41	12	7	65	2	0	0.384	0.152	Attractive Expectations
D18	35	17	6	65	4	0	0.333	0.187	Basic Expectations
D19	41	7	6	70	3	0	0.379	0.105	Attractive Expectations
D20	22	18	13	74	0	0	0.276	0.244	Basic Expectations
D21	41	15	8	59	4	0	0.398	0.187	Performance Expectations
D22	40	10	8	69	0	0	0.378	0.142	Attractive Expectations
D23	33	15	9	69	1	0	0.333	0.190	Basic Expectations
E24	39	6	5	76	1	0	0.349	0.087	Attractive Expectations
E25	39	10	6	71	1	0	0.357	0.127	Attractive Expectations
E26	34	7	6	79	1	0	0.317	0.103	Indifferent Expectations
E27	38	6	6	76	1	0	0.349	0.095	Attractive Expectations
E28	35	19	9	62	2	0	0.352	0.224	Performance Expectations
			Total				0.349	0.168	

Based on the parameter calculation results, the mean values of both parameters are used as the dividing line to plot a four-quadrant scatter diagram, enabling more accurate classification of requirement attributes. Here, the Better coefficient = (A+O)/(A+O+M+I), and the Worse coefficient = –(O+M)/(A+O+M+I) (2009) . (Table 4)

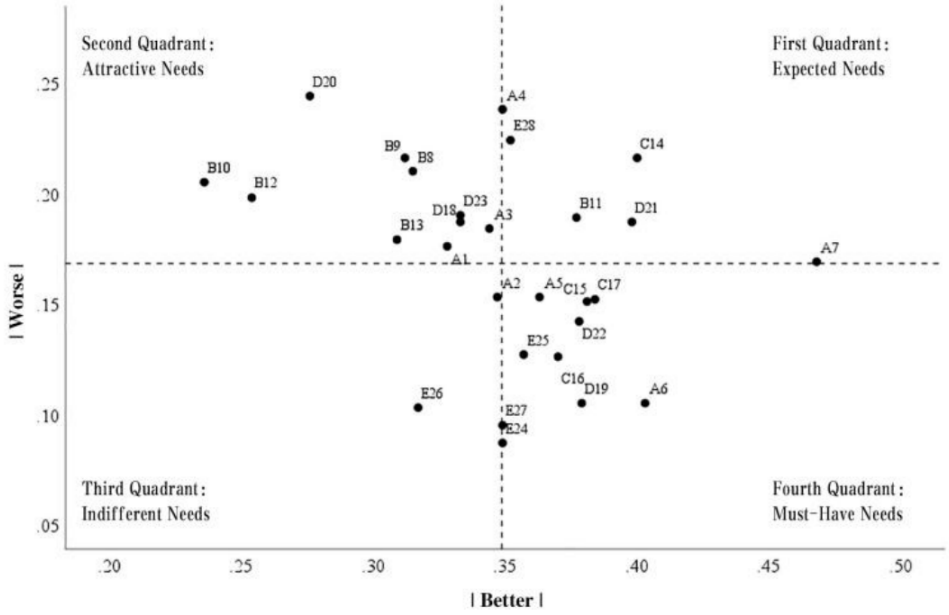

Fig 3: "Better-Worse" Four-Quadrant Scatter Plot

From the results presented, the first quadrant represents Expected Needs, which can eliminate and enhance customer dissatisfaction. (Fig 3) This quadrant should be prioritized for fulfillment. The second quadrant represents Attractive Needs, which do not eliminate customer dissatisfaction but can enhance customer satisfaction and are attributes that customers do not excessively anticipate. The third quadrant represents Indifferent Needs, which neither eliminate customer dissatisfaction nor enhance customer satisfaction, indicating attributes that customers are indifferent to. The fourth quadrant, Must-Have Needs, can eliminate customer dissatisfaction but does not enhance consumer satisfaction, representing things that customers consider obligatory (2021).

Table 5: The Importance Ranking of Different Types of Expectations

Type of Need	Importance Ranking
Expected Needs	A7>C14>D21>A4>B11>E28
Attractive Needs	A3>D23>D18>B9>B8>A1>D20>B13>B12>B10

Indifferent Needs	A2>E26
Must-Have Needs	A6>C17>C15>D22>A5>D19>C16>E25>E27>E24

Table 5: Using different demand attributes and dimensions as grouping indicators, each demand's priority was re-ranked. Among the Expected Needs type, the importance of each indicator, in descending order, is as follows: A7 (Artistic Appeal), C14 (Eco-friendly and Sustainable), D21 (Online Virtual Display and Purchase Channels), A4 (Custom Tailoring), B11 (Traditional Dyeing Techniques), and E28 (Cultural Dissemination and Heritage).

Table 6: The Importance Ranking of Different Dimensions of Expectations

Expectations Dimension	Importance Ranking
Brand Style Expectations	A7>A4>A6>A5>A3>A2>A1
Brand Design Expectations	B11>B9>B8>B13>B12>B10
Product Performance Expectations	C14>C17>C15>C16
Purchase Preference Expectations	D21>D22>D19>D23>D18>D20
Product Culture Expectations	E28>E25>E27>E24>E26

Table 6: The ranking results of different demand dimensions indicate that the importance of each demand, in descending order, is as follows: brand style, design, product performance, purchasing preference, and product cultural needs.

Expectations Sensitivity Analysis

Based on the quadrant classification, sensitivity is used as the indicator for prioritizing the order of requirements (2016). The sensitivity calculation formula is:

$$R = \sqrt{(BatterValue)^2 + (|Worse|Value)^2}$$

According to the calculation results, among all the indicators, A7 Artistic Appeal ranks first in priority, followed by C14 Eco-friendly and Sustainable, D21 Online Virtual Display and Purchase Channels. The

priorities of E26 Brand Marketing Culture, B12 Mass Production, and B10 Ethnic Style rank the lowest.

The brand style expectations primarily focus on three key aspects: custom tailoring (A4), artistic appeal (A7), and pure natural materials (A6). By accurately positioning these elements, the brand can attract target customer groups and establish a unique and robust market image. Custom tailoring involves providing personalized clothing services for cultural and textile dyeing exhibitions, allowing customers to participate in the design process, engage with designers, and experience dyeing firsthand, creating personalized clothing with emotional and cultural significance. Artistic appeal emphasizes using unique techniques to imbue clothing with artistic attributes, balancing commerce and art to tell stories and convey emotions through seasonal collections, enhancing market competitiveness. The use of pure natural materials aligns with the growing emphasis on ecological sustainability, satisfying consumer environmental awareness and serving as a differentiating factor that enhances product appeal (Gwozdz et al., 2017).

The brand design expectations for the Chinese plant-based dye brand "XiaRan" focus on three key elements: color requirements (B8), handcrafted quality (B9), and traditional dyeing techniques (B11). B8 emphasizes using natural plant dyes to create gentle gradient colors that harmonize with nature and cultural symbolism, showcasing the versatility and delicacy of plant-based dyeing through innovative color transitions and layering. B9 highlights the importance of craftsmanship, preserving and innovating traditional techniques by incorporating modern technology to enhance dyeing process stability and durability and blending traditional craftsmanship with contemporary fashion design. B11 focuses on utilizing and preserving traditional plant-based dyeing techniques, integrating them with modern design to create clothing that aligns with contemporary aesthetics, and exploring dyes on various fabrics to enhance product diversity and uniqueness (Aakko & Koskennurmi-Sivonen, 2013).

Fig 4: "XIARAN" Brand Image

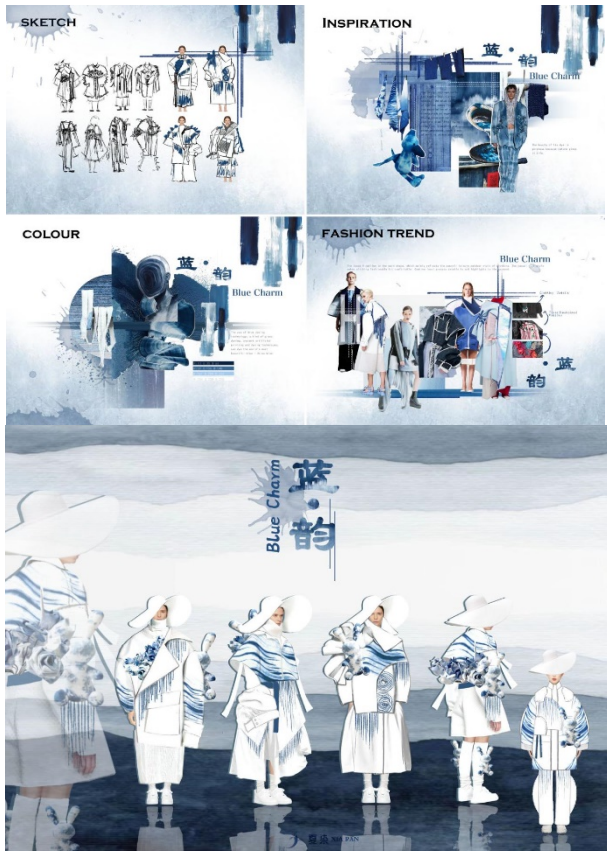

Fig 5: "XIARAN" Product Design

Product performance expectations for the brand "XiaRan" focus on eco-friendliness and sustainability (C14) as well as health and functional benefits (C15). The brand uses natural and renewable materials, ensuring

that every production stage minimizes environmental impact and that plant-based dyes are safe and healthy for producers and users. Additionally, "XiaRan" products offer significant health benefits, with indigo plant-based dyes providing antibacterial, anti-inflammatory, and hypoallergenic properties, making them suitable for sensitive skin. The emphasis on breathable and comfortable fabrics also contributes to stress relief and overall health benefits, reinforcing the brand's commitment to environmental sustainability, health, comfort, and innovation.

Purchasing preference expectations for the brand "XiaRan" focus on online and offline consumer experiences. Online, XiaRan offers a convenient shopping experience through 3D virtual simulation and CLO digital fashion displays, allowing consumers to understand product styles, effects, and textures intuitively. Offline brand experience stores and exhibitions provide interactive experiences related to plant-based dye culture and craftsmanship, such as on-site dyeing and hands-on workshops, which enhance customer loyalty and boost word-of-mouth marketing. XiaRan addresses diverse customer needs through multiple sales channels, including online platforms, physical stores, e-commerce partnerships, fashion boutiques, and art galleries. Participating in fashion shows and cultural events enhances the brand's visibility and image.

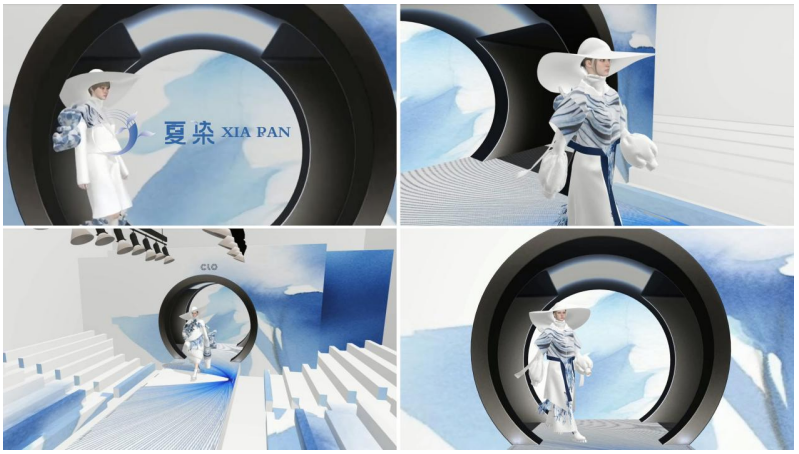

Fig 6: 3D virtual fashion show

Product cultural expectations for "XiaRan" focus on enhancing consumer aesthetics and disseminating Chinese plant-based dyeing culture. The brand aims to lead fashion and art trends through unique design and artistic expression, regularly releasing content related to traditional Chinese culture and collaborating with artists to educate and inspire consumers. This approach enhances cultural literacy and aesthetic values (E25). As a cultural carrier, XiaRan is also dedicated to preserving and promoting Chinese plant-based dyeing techniques, showcasing the aesthetics and craftsmanship to foster appreciation and respect for this cultural heritage. This commitment encourages design and educational research, contributing to sustainable development and strengthening the brand's cultural content and market competitiveness (E28).

The results showed that utilizing new knowledge to develop a series of innovative natural dye product designs maintains the continuity of traditional natural dyeing, successfully promotes market transformation by integrating traditional craftsmanship with modern fashion innovation, and especially rekindles interest in traditional natural dyes among young consumers.

5. Discussions

5.1 Discuss the Results

The results of this study highlight the complex and multi-faceted expectations of consumers for Chinese natural dye brands. By employing the Kano model, we could categorize these expectations into distinct dimensions, including brand style, design, product performance, purchasing preferences, and cultural aspects. The data analysis of 327 valid samples revealed that consumers value a blend of traditional craftsmanship and modern design, with high sensitivity towards artistic appeal, eco-friendliness, and advanced purchasing channels. The findings demonstrate that a brand like "XiaRan" can effectively leverage these insights to position itself uniquely in the market, integrating the rich heritage of natural dyeing with contemporary fashion trends.

5.2 Theoretical Implications

Theoretically, this study significantly contributes to natural dye brand research by applying the Kano model to analyze consumer expectations. This approach enhances our understanding of how traditional and modern elements can be balanced in brand positioning and provides a robust framework for categorizing and prioritizing consumer needs. Additionally, the study underscores the importance of sustainability in brand development, aligning with global trends towards eco-friendly and socially responsible practices. By integrating theoretical insights with practical applications, this research enriches the discourse on sustainable fashion and brand innovation (2020).

5.3 Practical Implications

Practically, this study offers valuable insights for brand managers and designers aiming to develop natural dye products that resonate with modern consumers. The findings suggest that focusing on artistic appeal, eco-friendliness, and innovative purchasing channels can significantly enhance brand competitiveness. For instance, the "XiaRan" series,

developed through this research, demonstrates the practical viability of combining traditional dyeing techniques with modern fashion design, attracting a younger demographic and promoting cultural heritage. Furthermore, establishing online virtual fashion shows and offline experiential stores provides a comprehensive strategy for engaging consumers and enhancing brand loyalty.

5.4 Limitations and Future Study

Despite its contributions, this study has several limitations. While substantial, the sample size of 327 may not fully represent the diverse consumer base for natural dye products, and future studies should consider more extensive and more varied samples to enhance generalizability. Additionally, the Kano model, primarily based on one-time surveys, might not capture the dynamic nature of consumer preferences over time. Longitudinal studies could provide deeper insights into how these expectations evolve. The study's focus on a single brand, "XiaRan," also limits the broader applicability of the findings. Future research could explore multiple brands and markets to validate and extend the current conclusions. Lastly, while this study combines qualitative and quantitative methods, there is room for more sophisticated analytical techniques to refine the understanding of consumer expectations and brand positioning strategies further.

6. Conclusion

This study aims to analyze the expectations of natural dye brand users using the Kano model, providing a solid reference for brand design. Through the data analysis of 327 valid samples, a sensitivity analysis of customer expectations is conducted, comparing and ranking the importance of different expectation attributes and dimensions. Ultimately, the study precisely positions the Chinese natural dye brand "XiaRan," which integrates traditional craftsmanship with modern elements. By exploring the design innovation potential of natural dyeing, centered

around the five critical expectations of brand users, this study has created the "XiaRan" series of fashion and accessory products, demonstrating the possibility of reviving traditional skills with contemporary design concepts. Establishing online virtual fashion shows and offline brand experience exhibitions has paved a new path for protecting and developing traditional natural dyeing cultural skills. This study illustrates the delicate balance between customer demand and product innovation for natural dyeing. It achieves its objectives and significantly contributes to traditional crafts and modern design, impacting design research and cultural heritage protection.

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