The Application of the KANO Demand Model in Cultural and Creative Products of the Screen Wall in Bi Gan Scenic Area

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Abstract. This study uses the KANO model to prioritize emotional consumer needs in Bi Gan Scenic Area's cultural and creative design, aiming to develop unique screen wall-themed products. Methods include demand research, building a hierarchical model via emotional design theory, analyzing needs with KANO sensitivity rankings, and extracting cultural symbols from the scenic area's mythology to create user-centric products. Combining three-tier emotional design with KANO, the study defines a pathway to transform Bi Gan's patriotic spirit through screen wall-themed designs, expanding creative expressions and offering a model for promoting patriotic values.

Keywords: Bi Gan Scenic Area Shadow Wall; User research; KANO requirement model; Cultural and creative product design;

1 Introduction

Xinxiang Weihui, a historic Henan city by the ancient Yellow River and east of Taihang Mountains, is renowned as the burial site of Bi Gan, a Shang - Dynasty loyal minister and ancestor of the Lin family, drawing numerous visitors. The glazed screen wall in the Bi Gan Scenic Area blends ceramic art with local culture, playing a role in cultural inheritance. Yet, existing cultural and creative products suffer from issues like inadequate user research, subjective design, low innovation, homogenization, and lack of alignment with user needs.

Guided by the KANO model, this study aims to pinpoint core user demands, create targeted products, and promote Bi Gan's spirit of loyalty. Focusing on the scenic area's screen walls, it uses the KANO model to analyze customer needs' priorities through design practice, integrating screen wall patterns into innovative designs. By combining the KANO model with three - level emotional design theory and using cultural and creative products as carriers, it explores a design approach for screen - wall - themed cultural and creative products fitting the modern context.

K. Chulsoo et al. (eds.), *Proceedings of the 2025 4th International Conference on Art Design and Digital Technology (ADDT 2025)*, Advances in Computer Science Research 123,
https://doi.org/10.2991/978-94-6463-815-8_52

2 KANO Model Theory and Research

In recent years, many scholars have applied the Kano model in packaging design and development. He Lujun [1] used the Kano model to survey consumer needs, constructing an information translation model for design practice and validating the method's feasibility. Li Na [2] employed linear and nonlinear mathematical models to calculate user satisfaction fitting functions, providing a quantitative approach to optimize overall packaging design for more objective evaluations. These studies demonstrate that the Kano model has been widely validated through practical applications in classifying packaging attributes and analyzing user needs. This paper aims to incorporate demand sensitivity for a more comprehensive analysis of consumer needs, guiding the design and implementation of Bi Gan Scenic Area's screen wall - themed cultural and creative products.

3 Analysis of User Needs for Cultural and Creative Products of Bi Gan Scenic Area Screen Wall

3.1 User Research

This study adopted the survey method for data collection, distributing a total of 120 electronic questionnaires with a response rate of 91.67%. Based on the survey results, an in-depth analysis of the target users was conducted, and the collected data was processed using frequency analysis. As shown in Table 2, the results indicate that post-1990s women are the core consumer group for cultural and creative products, demonstrating strong consumption vitality in new first-tier and second-tier city markets. In terms of gender, 75% of the consumer base for cultural and creative products are women; in terms of age, 55% of consumers belong to the post-1990s generation; and in terms of urban classification, the majority of consumers are from new first-tier and second-tier cities. The specific survey data are shown in Table 1.

Table 1. Classification of emotion needs

Category	Option Name	Percentage (%)	Cumulative Percentage (%)
Gender	Female	70	70
	Male	30	100
Age	Post-2000	45	45
	Post-1990	35	80
	Pre-1990	20	100
City Tier	First-tier	25	25
	Second-tier	40	65
	Third-tier	35	100
Total	—	100	100

From the perspective of user consumption demand, the primary purpose of purchasing cultural and creative products is for collection and display, accounting for 65%.

Regarding purchasing intent, 78% of consumers show a conditional buying tendency, indicating they are inclined to purchase cultural and creative products that align with their personal interests and values. In terms of consumption habits, consumers generally make purchases every two to three months, with spending mainly concentrated in the 100 - 200 RMB range, reflecting a certain periodicity and budget planning. When it comes to purchase channels, scenic area stores are the primary choice[3]. Consumers show a preference for cultural and creative products featuring scenic area IP images, followed by those with regional cultural symbols and modern designs integrating traditional elements, as shown in the table.

Table 2. Classification of emotion needs

egory	Option Name	Option Frequency	Percentage (%)	Cumulative Percentage (%)
Purchase Purpose	Collection & Display	65	65	65
	Daily Use	22	22	87
	Gift Giving	10	10	97
	Brand Commemoration	3	3	100
Purchase Intention	Align with Interests/Values	78	78	78
	Impulse Purchase	15	15	93
	Only Browsing	5	5	98
Consumption Frequency	Every 2-3 Months	55	55	55
	1-2 Times a Year	30	30	85
	Almost Never Purchase	5	5	100
Expenditure Amount	100-200yuan	58	58	58
	Below100 yuan	25	25	83
	200-300 yuan	17	17	100
Purchase Channel	Scenic Area Store	70	70	70
	E-commerce Platform	18	18	88
	Tourism Souvenir Store	12	12	100
total	—	100	100	—

Table 3. Classification of consumer demand factors

Number	Demand factors	Number	Demand factors	Number	Demand factors	Number	Demand factors
A1	Innovation	A6	Color interpretation	B1	Practicality	C1	Beautiful meaning
A2	Expression of shape	A7	Traditional elements integration	B2	Safety	C2	Emotional resonance
A3	Reflection of local culture	A8	Distinctive symbols	B3	Durability	C3	Fashion trend elements
A4	Gift attributes	A9	Reasonable price	B4	Traditional craft materials	C4	Personalization
A5	Decorative patterns	A10	Memorial significance	B5	Creative packaging	C5	Promote cultural confidence

Based on demand element types and the Bi Gan Scenic Area screen wall features, users' emotional needs are categorized into three levels (instinctive, behavioral, reflective) per Norman's emotional design theory. Table4 shows the integration of these three levels with 20 demand elements.

Table 4. Detailed table of demand elements

number	Demand factors	M	O	A	I	S_{SI}	S_{DSI}	type
A1	Innovation	23	13	15	39	31.11%	-40.00%	I
A2	Expression of shape	13	33	23	21	62.22%	-51.11%	O
A3	Reflection of local culture	12	35	25	18	66.67%	-52.22%	O
A4	Gift attributes	30	18	24	18	46.67%	-53.33%	M
A5	Decorative patterns	12	35	25	18	66.67%	-52.22%	O
A6	Color interpretation	14	30	25	21	61.11%	-48.89%	O
A7	Traditional elements integration	22	18	19	31	41.11%	-44.44%	I
A8	Characteristic symbols	25	14	16	35	33.33%	-43.33%	I
A9	Reasonable price	27	23	17	23	44.44%	-55.56%	M
A10	Memorial significance	29	24	18	19	46.67%	-58.89%	M
B1	Practicality	23	14	12	41	28.89%	-41.11%	I
B2	Safety	30	23	11	26	37.78%	-58.89%	M
B3	Durability	22	13	16	39	32.22%	-38.89%	I
B4	Traditional craft materials	14	28	16	32	48.89%	-46.67%	I
B5	Creative packaging	25	23	14	28	41.11%	-53.33%	I
C1	Beautiful meaning	11	32	34	13	73.33%	-47.78%	A
C2	Emotional resonance	13	34	25	18	65.56%	-52.22%	O
C3	Fashion trend elements	21	25	15	29	44.44%	-51.11%	I
C4	Personalization	25	25	10	30	38.89%	-55.56%	I
C5	Promote cultural confidence	12	31	20	27	56.67%	-47.78%	O

3.2 Determining the Type of Demand Indicators Based on the KANO Model

The KANO model analyzes questionnaire options to clarify demand attributes. Formulas (1)-(2) calculate Satisfaction Coefficient (SSI) and Dissatisfaction Coefficient (SDSI) (see Figure 1). Higher SSI (near 1) indicates greater satisfaction improvement when a demand is met; lower SDSI (near -1) signals stronger negative impact from unmet needs. Better and |Worse| values for each indicator are used to create a four-quadrant scatter plot with mean critical lines[4], distinguishing "excitement points" (key priorities) from "basic points" (must-have needs) to guide design decisions.

$$S_{SI} = \frac{F(A)+F(O)}{F(A)+F(O)+F(M)+F(I)} \tag{1}$$

$$S_{DSI} = -\frac{F(O)+F(M)}{F(A)+F(O)+F(M)+F(I)} \tag{2}$$

3.3 Conclusion Analysis

Conclusion Analysis In the classic KANO model, the priority of demand factors follows the traditional logic of M (Must-have) > O (One-dimensional) > A (Attractive) > I (Indifferent). American scholars Berger et al. innovatively expanded the traditional model by introducing Sensitivity (S)of demand factors as a new consideration dimension. The level of the S value directly reflects the importance of a demand in users' minds—the higher the value, the higher the priority the demand should have in the design process. Formula (3) was used to accurately calculate the sensitivity of each demand factor, and a new demand priority ranking was determined accordingly. The specific calculation process and ranking results are detailed in Tables 3 and 4 for reference in subsequent analysis and design practice[5]. The detailed data are shown in Table 5.

$$S = \sqrt{|B_{better}|^2 + |W_{worse}|^2} \tag{3}$$

Table 5. Ranking results of demand factor (S) values

number	Demand factors	S	Sort
A1	Innovation	0.51	18
A2	Expression of shape	0.81	5
A3	Reflection of local culture	0.85	2
A4	Gift attributes	0.71	10
A5	Decorative patterns	0.85	3
A6	Color interpretation	0.78	6
A7	Integration of traditional cultural elements	0.61	16
A8	Characteristic symbols	0.55	17
A9	Reasonable price	0.71	9
A10	Memorial significance	0.75	7
B1	Practicality	0.50	20
B2	Safety	0.70	11
B3	Durability	0.51	19
B4	Traditional craft materials	0.68	14
B5	Creative packaging	0.67	15
C1	Beautiful meaning	0.88	1
C2	Emotional resonance	0.84	4
C3	Fashion trend elements	0.68	13
C4	Personalization	0.68	12
C5	Promote cultural confidence	0.74	8

The priority analysis of demand factors points out the direction for the cultural and creative design of screen walls: at the instinctive level, reflecting local culture (A3) and pattern decorativeness (A5), as the top two expected attributes, require extracting elements such as vases and four-leaf clovers from screen wall brick carvings to strengthen the visual core and cultural recognition, thereby enhancing visual satisfaction; at the behavioral level, safety (B2) is a must-have attribute, necessitating ensuring material

and structural safety, while traditional craftsmanship materials (B4), with the highest sensitivity coefficient, require integrating techniques like chiseling to convey Bi Gan's cultural value; at the reflective level, auspicious meaning (C3) stands out with a prominent sensitivity coefficient, requiring the translation of symbols such as "welcoming auspiciousness and blessings" from screen walls, and promoting cultural confidence (C5) requires transmitting Bi Gan's patriotic spirit through the reconstruction of screen wall outlines and colors to achieve a modern expression of culture.

4 The Composition and Expression of Screen Wall Patterns

In ancient architecture, screen walls showcase unique global significance through rich decorative styles, diverse themes, exquisite craftsmanship, vivid colors, and symbolic carvings, embodying regional culture and family values—e.g., literati favor "four gentlemen" motifs, filial families use *Classic of Filial Piety* stories, and families with travelers adopt caravan/landscape symbols. Their symmetrical compositions balance order and variation.

The Bi Gan Scenic Area's screen wall features an elaborate peony design with winding branches and scrolling grass. In full bloom, peonies symbolize wealth and prosperity for Lin descendants. At the base, peony roots in a small vase evoke "falling leaves return to roots," signifying Lin family members' inevitable bond to Bi Gan Temple as their ancestral home. As Bi Gan is the Lin family's founding ancestor, the pattern blends auspicious blessings with a reminder of heritage and roots.

5 Design Practice of Cultural and Creative Products for Bi Gan Scenic Area

Based on user research showing 70% female and 80% post - 90s and post - 00s users, this design extracts Ruyi outlines and peony patterns from Bi Gan Scenic Area's screen walls, combines them with auspicious cinnabar, and creates a jewelry set. Guided by the Kano model, it satisfies users on three levels: at the instinctive level, the cinnabar's vivid red, 3D peonies, and auspicious Ruyi shapes create visual appeal; at the behavioral level, adjustable necklaces, lightweight earrings, engraved bracelets, and an elegant gift box balance practicality and cultural functions; at the reflective level, it triggers emotional resonance by linking traditional symbols like peonies and Ruyi to Bi Gan's spirit.

This jewelry set, integrating traditional elements with modern materials, forms a design logic chain of "visual symbols—functional experience—emotional resonance." It modernizes Bi Gan culture's core values and meets young users' multi - dimensional needs, providing a template for scenic area cultural and creative products to inherit and disseminate regional culture in modern consumption. The design works are shown in Figure 1 and Figure 2 as below.

Fig. 1. Cultural and Creative Product Design

Fig. 2. Cultural and Creative Product Design

6 Conclusions

In the design of cultural and creative products for Bi Gan Scenic Area, an integrated qualitative-quantitative approach uses the KANO model to categorize user needs into basic, expectant, and attractive types, ensuring market alignment and differentiation. Guided by Donald Norman's emotional design theory, the framework focuses on three levels: enhancing visual/material appeal (instinct), optimizing functionality/usability (behavior), and conveying Bi Gan's spirit through cultural symbols (reflection). This systematic approach transforms screen wall culture into core product value, enabling creative transformation of traditional culture and offering a replicable model for cultural tourism integration and innovative inheritance.

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