



# Research on the design of museum cultural and creative products based on the KANO model

Lian Chen<sup>a\*</sup>, Chengjun Zhou<sup>b</sup>

School of Arts & Design, Hubei University of Technology, Hubei Province, China

<sup>a</sup>1770376918@qq.com, <sup>b</sup>635532939@qq.com

**Abstract.** To improve the design efficiency of museum cultural and creative products and to provide design method references for them. The Kano model is used to classify the design attributes of museum cultural and creative products, distinguish the excitement attributes, desired attributes, basic attributes, irrelevant attributes, and inverse attributes in the design attributes, and combine the results of user satisfaction calculation to design museum cultural and creative products in a targeted manner, to maximize the user satisfaction of museum cultural and creative products. The Kano model can be applied to the design of museum cultural and creative products to efficiently improve the satisfaction of users with museum cultural and creative products.

**Keywords:** Kano, users, museums, cultural and creative products

## 1 Introduction

The material life has been satisfied, which makes people's consumption center of gravity turn to the spiritual and cultural aspects. Under such a background, the cultural and creative products of museums have shown a booming development. However, in recent years, the design of museum cultural and creative products still appears to be relatively young, and most of its research is conducted from the aesthetic perspective of the sensibility of cultural and creative products. Based on this, this paper adopts the Kano model to calculate the satisfaction of the design attributes of museum cultural and creative products from a rational point of view, to expand the design ideas of museum cultural and creative products, and then maximize the satisfaction of users with museum cultural and creative products.

## 2 The Kano model

The Kano model is a useful tool proposed by Japanese quality management guru Noriaki Kano for classifying and prioritizing user needs, reflecting the nonlinear relationship between product performance and user satisfaction. The Kano model divides the user study into five parts, namely must-be attributes(M), one-dimensional attributes(O), attractive attributes(A), indifferent attributes(I), reverse attributes(R)<sup>[1]</sup>. Among them,

© The Author(s) 2024

R. Appleby et al. (eds.), *Proceedings of the 2nd International Conference on Intelligent Design and Innovative Technology (ICIDIT 2023)*, Atlantis Highlights in Intelligent Systems 10, [https://doi.org/10.2991/978-94-6463-266-8\\_44](https://doi.org/10.2991/978-94-6463-266-8_44)

the irrelevant attribute means that the attribute is realized or not does not affect the user satisfaction, and the degree of the other four attributes is related to user satisfaction, see Figure 1.

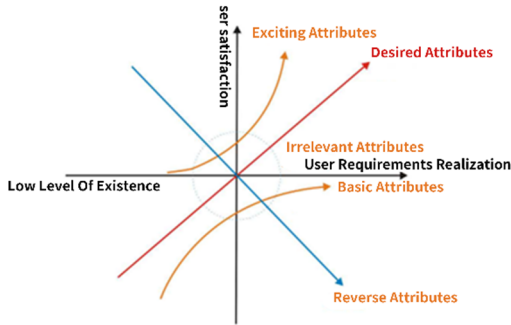


Fig. 1. The Kano model

The Kano model is used to classify design attributes to facilitate targeted design and maximize user satisfaction. Kano model has been widely used in the fields of cultural and creative product design [2-3] and user requirements [4-5]. Wang Tianxiang et al. used the Kano model to analyze the characteristics and attributes of the cultural factors of Huizhou architecture, to excavate the cultural design factors that meet users' demands [6]. Li Wen et al. used the Kano model to derive consumer preferences for cultural attributes of museum cultural and creative products, and proposed design points for museum cultural and creative products from three levels [7]. Wei-Wei Wang et al. obtained the user needs of cultural and creative products and designed products with both operative experience and deep emotional resonance [8]. In the process of museum cultural and creative product design, the Kano model can explore the key design attributes of museums and prioritize the design attributes according to user satisfaction, and design museum cultural and creative products that satisfy users.

### 3 Kano model-based approach to museum cultural and creative product design

In this paper, the design of museum cultural and creative products is selected and the Kano model is used for its design. The main steps are: (1) determining the design attributes of the museum's creative products, (2) Kano model classification, (3) calculating user satisfaction and user dissatisfaction, and (4) carrying out the design.

#### 3.1 Determine the design attributes of museum cultural and creative products

A combination of online and offline questionnaires was used to investigate the people who buy museum cultural and creative products are mostly young people, with their ages concentrated 16-28 years old. According to the results of the survey, 50 young

people from Hubei, aged 16-28 years old, who have purchased museum cultural and creative products more than twice, were selected to design museum cultural and creative products for them, which has a certain demonstration significance.

The design attributes reflect the organic combination of user needs and the cultural promotion and marketing objectives pursued by the museum sector, and the design attributes of the museum's creative products were finally determined under the synthesis, as shown in Table 1.

**Table 1.** The design qualities for the museum cultural and creative products

ID	Level 1 Design Properties	Level 2 Design Properties
D1		Use of functions
D2	Practicality	Convenient operation
D3		Easy to carry
D4	Dissemination	Cultural Communication
D5		Aesthetically pleasing
D6	Aesthetics	Simple and generous
D7		Vivid and interesting
D8		Special Unique
D9	Education	Educational Science
D10	Emotion	Cultural Identity

### 3.2 Kano Model Classification of Product Design Attributes of Museum Cultural and Creative Products

By using the Likert scale to obtain the relevant data of the target users, the Kano classification of the product design attributes of museum cultural and creative products was conducted, and the design attributes of cultural and creative products were determined by the five responses: "like, want, indifferent, don't want, and dislike", and the judgment results can be referred to Table 2 [8].

**Table 2.** Judgement matrix of design qualities Kano categories

		Property not implemented				
		Like	Want	Indifferent	Don't want	Dislike
Property Implementation	Like	Q	A	A	A	O
	Want	R	I	I	I	M
	Indifferent	R	I	I	I	M
	Don't want	R	I	I	I	M
	Dislike	R	R	R	R	Q

The Kano model classification of product design attributes for museum cultural and creative products was tested on 50 participants using a Likert scale, and the Kano model categories for each design attribute were determined based on the results of the test.

Design attributes D1 to D10 were determined by the highest percentage of A, O, M, I, and R. Where multiple Kano model category percentages were present for a design attribute, they were based on the influence of the Kano model category, i.e.,  $M > O > A > I$  [9]. The Kano model categories for the museum cultural and creative product design attributes D1 to D10 are shown in Table 3.

**Table 3.** Kano categories of the cultural and creative products

Properties	Kano model attribute categories					Cl-as-sifi-cation
	A(%)	O(%)	M(%)	I(%)	R(%)	
ID_1 (Positive) & ID_1 (Negative)	0.00	4.00	76.00	20.00	0.00	M
ID_2 (Positive) & ID_2 (Negative)	0.00	2.00	74.00	24.00	0.00	M
ID_3 (Positive) & ID_3 (Negative)	14.00	56.00	22.00	4.00	0.00	O
ID_4 (Positive) & ID_4 (Negative)	16.00	46.00	30.00	6.00	0.00	O
ID_5 (Positive) & ID_5 (Negative)	0.00	2.00	76.00	18.00	4.00	M
ID_6 (Positive) & ID_6 (Negative)	0.00	0.00	0.00	94.00	6.00	I
ID_7 (Positive) & ID_7 (Negative)	0.00	0.00	14.00	86.00	0.00	I
ID_8 (Positive) & ID_8 (Negative)	80.00	0.00	0.00	16.00	0.00	A
ID_9 (Positive) & ID_9 (Negative)	28.00	50.00	10.00	12.00	0.00	O
ID_10 (Positive) & ID_10 (Negative)	60.00	0.00	0.00	38.00	2.00	A

**3.3 Calculating User Satisfaction with Product Design Attributes of Museum Cultural and Creative Products**

The data collected for the museum's cultural and creative products were categorized and summarized, and calculated separately by substituting the Kano model (where S represents satisfaction and D represents dissatisfaction).

The satisfaction rate is

$$S=(O+A)/(M+O+A+I)$$

The value range is 0~1, and the closer the value is to 1, the higher the satisfaction is. Dissatisfaction is:

$$D = (O+M)/(M+O+A+I) \times (-1)$$

The range of values is -1 to 0. The closer the value is to -1, the higher the dissatisfaction is indicated<sup>[10]</sup>.

Based on the prioritization of satisfaction and dissatisfaction, the importance of design attributes can be determined.

According to equation (1) and equation (2), user satisfaction and user dissatisfaction were calculated for each design attribute of museum cultural and creative products, which are shown in Table 4.

**Table 4.** Design attribute satisfaction of museum cultural and creative products

Design Properties	kano Categories	User satisfaction	User dissatisfaction
ID_1 (Positive) & ID_1 (Negative)	M	4.00%	80.00%
ID_2 (Positive) & ID_2 (Negative)	M	2.00%	76.00%
ID_3 (Positive) & ID_3 (Negative)	O	72.92%	81.25%
ID_4 (Positive) & ID_4 (Negative)	O	63.27%	77.55%
ID_5 (Positive) & ID_5 (Negative)	M	2.08%	81.25%
ID_6 (Positive) & ID_6 (Negative)	I	0.00%	0.00%
ID_7 (Positive) & ID_7 (Negative)	I	0.00%	14.00%
ID_8 (Positive) & ID_8 (Negative)	A	83.33%	0.00%
ID_9 (Positive) & ID_9 (Negative)	O	78.00%	60.00%
ID_10 (Positive) & ID_10 (Negative)	A	61.22%	0.00%

### 3.4 Carrying out the design

Determining the user satisfaction and user dissatisfaction for each design attribute allows for targeted design. There are 10 design attributes in the design of museum cultural and creative products, and Table 4 shows that when D3, D4, D8, D9, and D10 are fully realized, user satisfaction increases significantly, especially D8 and D9. D8 and D10 are the excitement attributes, which are the key factors to be considered when designing museum cultural and creative products, and D8 "special uniqueness" is the key to creating the differentiation of museum cultural and creative products. D9 "Education and popularization" is based on the mission of education and popularization of museum cultural products, which is to convey the historical origin and cultural background of museum cultural relics to consumers. When the design attributes D1, D2, D3, D4, and D5 user dissatisfaction is very low, especially D3 and D5, beautiful appearance and ease to carry can greatly reduce user dissatisfaction. When D4 is realized, user dissatisfaction will be greatly reduced.

## 4 Conclusion

Using the KANO model for the design of museum cultural and creative products can help designers accurately control the design elements and improve the design efficiency through the calculation of user satisfaction, and it can also effectively improve the user satisfaction of museum cultural and creative products.

## References

1. WEI Jiaying, GUO Xuanwen. Research on service design of red rural tourism based on Kano model[J]. *Packaging Engineering*,2023,44(04):379-389.
2. WANG Luyao, ZHOU Yuhui, LI Yongchun. Research on cultural and creative design of museums based on hierarchical analysis[J]. *Packaging Engineering*,2022,43(18):320-326.
3. YAN Simin, WANG Kexin, GAO Zixuan et al. Customer demand analysis of museum cultural and creative products based on Kano model[J]. *Modern Business Industry*,2020,41(05):64-66.
4. WANG Shuang, YIN Guofu, HE Zhongxiu. Research on user demand index system based on Kano model[J]. *Packaging Engineering*,2006(04):209-210+213.
5. HOU Zhi, CHEN Shiping. Research on the Adjustment Method of User Requirements Importance Based on Kano Model[J]. *Computer Integrated Manufacturing Systems*,2005(12):1785-1789.
6. WANG Tianxiong, ZHOU Meiyu. Paradigm construction of cultural and creative product design based on users' perceptual needs[J]. *Packaging Engineering*,2020,41(20):14-18+23.
7. Li Wen, Zhang To. Research on consumer preference of museum cultural and creative products based on KANO model[J]. *Design*,2019,32(17):76-79.
8. WANG Weiwei, LIU Yunzhi, YANG Xiaoyan et al. Research on cultural and creative product design under user behavior and context orientation[J]. *Packaging Engineering*,2019,40(24):27-32.
9. Tang Zhou, Liu Zhuo. Product charm quality creation in product design[J]. *Packaging Engineering*,2011,32(02):112-115.
10. KUO Y. Integrating Kano's Model into Web-com-munity Service Quality[J].*Total Quality Management & Business Excellence*,2004,15(7):925-939.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

