

THE CHALLENGES OF APPLYING KANO'S METHOD TO FOOTWEAR DESIGN

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Abstract: The objective of this study was to investigate the challenges of applying Kano's method to the aesthetic design of leather shoes. Seventeen Mainland Chinese participated in the study where forty customer requirements were evaluated. The major issues in relation to eliciting the design parameters are discussed in this paper.

Introduction

Kano and his colleagues [1] developed a methodology to classify product attributes into different categories. Their method has been applied to improve webpage design [2], employee satisfaction [3], consumer product packaging [4], ski equipment [5] and so on. Understanding the attractive and basic needs of a product is critical for product success [6]. Hence this paper aims to investigate the challenges and potential variations of Kano's method for eliciting the form related attributes of leather footwear.

The customer requirement (CR) surveys developed by Kano [1] has many paired questions with the respondent having to select one of five responses: "I like it that way", "It must be that way", "I am neutral", "I can live with it that way" and "I dislike it that way". Other researchers have suggested that the responses may be context or product dependent and have suggested variations to the above [4], [7]. Each paired question comprises a functional question, which is in relation to the presence of the customer requirement and a dys-functional question, which is a question asking for the respondent's feeling in the absence of the customer requirement [1], [7]. Depending on the response to the functional as well as the dys-functional question, the particular response is categorized as *attractive (A)*, *must-be (M)*, *one-dimensional (O)*, *indifferent (I)*, *reverse*

(R) and *questionable (Q)* according to a matrix similar to that shown in Table 1 [8].

Methodology

Participants: Seventeen Mainland Chinese (9 females, 8 males) with ages ranging from 20 to 45 years and with a mean age of 28.5 ± 8.9 years responded to the questionnaire.

Materials and procedures: The questionnaire had 40 pairs of multiple-choice questions (that is, 80 individual questions), which were collated by interviewing leather shoe wearers in Mainland China. The available responses to each question are given in Table 1 and are adapted from [8]. Participants responded to a Chinese version of a web-based questionnaire. To eliminate any bias in the responses, the 40 dys-functional questions immediately followed the 40 functional questions.

Results

A total of six hundred and eighty pairs of answers (=17 subjects * 40 pairs of questions) were collected. The paired-question responses were classified into the six categories of *A*, *M*, *O*, *R*, *Q*, and *I* according to table 1. Based on this categorization, 43% (N=292), 19% (N=127), 17% (N=116), 15% (N=102), 4% (N=28) and 2% (N=15) of the total responses were classified as *indifferent*, *must-be*, *attractive*, *reverse*, *one-dimensional* and *questionable* responses respectively (Figure 1).

For each CR, the frequency of each category, $f(\text{category})$, was calculated and some of these are shown in table 2. Some researchers [7] have pointed out the weakness of using the mode for the categorization. Hence, after the frequencies were calculated, the 'modified mode statistic' [7] was used to assign the overall grade for each CR as follows:

If $(f(A)+f(M)+f(O)) > (f(R)+ f(Q)+ f(I))$,
 Then grade = category of $\max(f(A), f(M), f(O))$,
 Else grade = category of $\max(f(R), f(Q), f(I))$.

Based on the above, eight CRs were graded as *attractive* (A), seven CRs were graded as *must-be* (M), five CRs were graded as *reverse* (R) and the remaining 20 were classified as *indifferent* qualities. Some of these CRs are shown in table 2.

A reverse CR (Table 2), implies that the respondents liked the absence of the parameter. A detailed investigation revealed that 7 out of 15 responses in the *questionable* category came from one respondent, indicating the need to investigate the outliers in the data.

Table 1: The categorization of responses where A: Attractive, M: Must-be, O: One-dimensional, R: Reverse, Q: Questionable; I: Indifferent. Numbers in parenthesis are the frequencies of each paired response for all questions.

		Dys-functional question				
		1	2	3	4	5
Functional question	1	Q (0)	A (1)	A (51)	A (64)	O (28)
	2	R (0)	Q (11)	I (131)	M (100)	M (15)
	3	R (1)	I (8)	I (153)	M (10)	M (2)
	4	R (4)	R (29)	R (50)	Q (3)	Q (0)
	5	R (6)	R (4)	R (8)	Q (1)	Q (0)

Discussion

The results show that 20 out of the 40 CRs were categorized as being indifferent, possibly due to the nature of the questions [7]. Statements in relation to certain aspects of footwear may not be of too much concern to footwear wearers and that could have possibly resulted in their indifference. For example, more than 50% of the responses to CR02, CR04, CR06, CR35, CR36, CR37 and CR38 were “I feel neutral” in both the functional as well as dys-functional questions (Table 1). These CRs relate to color, accessories

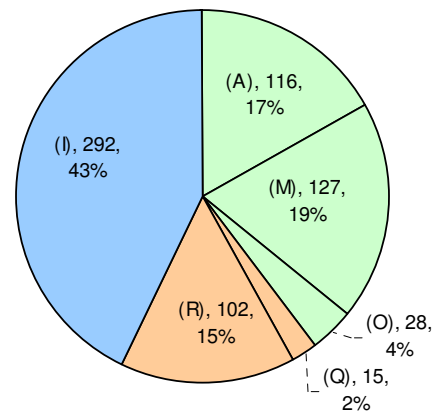


Figure 1: The frequency statistics of the six categories for the 680 paired responses

Table 2: Frequencies and grades of 12 sample customer requirements

Customer Requirement (CR)	f(A)	f(M)	f(O)	f(R)	f(Q)	f(I)	Grade
CR09 Has a thick outsole in front (more than 2cm)			1	12	1	3	R
CR10 Has a high heel inside the shoe that cannot be seen from outside				13		4	R
CR14 Has narrow toe style				10		7	R
CR15 Has a throat line much lower than ankle				11	1	5	R
CR34 Make you look formal				12		5	R
CR02 Has only one upper color	1			6	1	9	I
CR04 Has dark color	1	2		2	1	11	I
CR06 Has low heel (less than 3cm)	2			1	1	13	I
CR35 Has an adjustable strap	2	1				14	I
CR36 Has laces	2	3				12	I
CR37 Unisex style	2			3		12	I
CR38 Unique style		1		2	1	13	I

(e.g. adjustable strap and laces) and shoe style (low heel, unisex style and unique style). Such

aspects may be situation dependent or are possibly too specific to be evaluated. The indifferences

might be also due to the wording of the five responses. The spirit of Kano's method is to use the responses of each pair of questions to classify, but not rank, the features or functions into one of the six categories [7]. However, according to [8], the word "like" was used in four of the five responses and the respondents may have perceived the wording to imply different degrees of liking. To overcome such a problem, Berger et al. [7] recommended the use of the responses "I like it", "I expect it", "I am neutral", "I can tolerate it" and "I dislike it". These can be translated into Chinese to be "我喜欢", "我期望如此", "我无所谓", "我可以忍受" and "我不喜欢" respectively. Such a set allows a respondent to classify rather than rank a feature or function.

The data outliers could possibly be due to the ordering of the paired questions. The paired-questions were separated from each other in order to eliminate any bias of comparing the response of one question against the other. However, the *reverse* and *questionable* responses may be an indication that the respondents may have been puzzled by having to answer what appeared to be a similar question in the second-half of the questionnaire. In the original Kano questionnaire [1], the questions are presented in pairs with the functional question directly following the dysfunctional question and hence the respondent is able to identify the difference in the questions as well as their responses to each. It is worth testing the pair-by-pair option in order to compare the results with the present study.

Conclusion

A Kano type of questionnaire was used to categorize 40 customer requirements relating to the aesthetics of leather footwear. The results showed that 8 CRs were *attractive*, 7 CRs were *must-be*, 5 CRs were *reverse* and the other 20 CRs were categorized as *indifferent*. This outcome clearly reflects potential weaknesses of the questionnaire. More specifically, the results indicate the need for using the right set of responses paying attention to the ordering of the questions and the importance of phrasing the questions correctly in order to make the process and the outcome worthwhile.

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