IDENTIFICATION OF KANO ATTRIBUTES IN ORANGE JUICE

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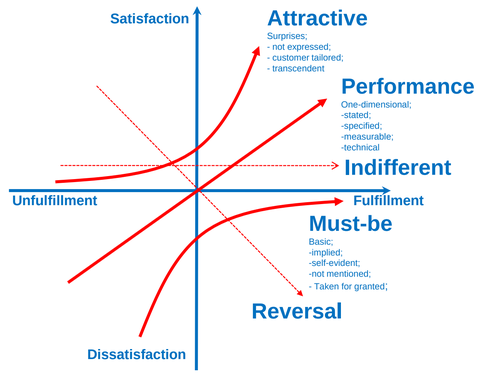
INTRODUCTION

In the Kano theory, product attributes are classified into five categories, i.e. Attractive, Performance/One-dimensional, Must-be, Indifferent and Reversal, according to their relationships with consumer satisfaction and dissatisfaction[1] (Figure 1) .

Figure 1. Kano modeling of consumer satisfaction[3]



An “Attractive” attribute will stimulate consumer satisfaction when present but no dissatisfaction when it is not offered. The quality of a “Performance” attribute is proportional to consumer satisfaction and dissatisfaction. A product will be accepted without satisfaction when its “Must-be” attributes are fulfilled and be rejected when these attributes are unfulfilled. Indifferent attribute will not affect satisfaction or dissatisfaction. Reversal attribute performs in an opposite direction as a Performance attribute does.

The Kano attribute classification is useful in product design to prioritize development efforts[2].

OBJECTIVES

The objectives of this study were to classify orange juice attributes according to the Kano nomenclature and to determine the appropriateness of the Kano methodology for food.

MATERIALS AND METHODS

An online survey was developed to collect consumer reactions to the quality of seven orange juice attributes (orange color, orange flavor, sweetness, sourness, pulpiness, thickness and freshness). Orange juice consumers (n=1072) participated in the survey.

An Attribute’s functionality was defined as its intensity level within consumers’ desire/acceptance; while dysfunctionality was described as a “too much” or “too little” intensity level. Consumer preferences for attribute performance levels (functional/dysfunctional) were measured using a 5-level verbal scale (1 = I would enjoy it more that way; 2 = This is a basic requirement for me to accept this product; 3 = This would not affect my acceptance of this product; 4 = I dislike it that way, but could tolerate it; 5 = I dislike it that way, and would not accept it)[3].

The Kano status of attributes was determined using a modified interpretation table (Table 1).

Orange color		When orange juice is either TOO DARK or TOO LIGHT in ORANGE COLOR, how do you feel? (Dysfunctional Form)				
		1	2	3	4	5
When orange juice has a DESIRABLE/ACCEPTABLE level of ORANGE COLOR, how do you feel? (Functional Form)	1	Q	A	A	A	P
	2	R	Q	I	I	M
	3	R	R	I	I	M
	4	R	R	R	Q	M
	5	R	R	R	R	Q

A=Attractive P=Performance M=Must-be I=Indifferent R=Reversal Q=Questionable

Table 1. Modified interpretation table

Consumers’ preferred intensity levels for sweetness, sourness, and pulpiness were collected to determine if any segmentation existed among consumers.

RESULTS AND DISCUSSION

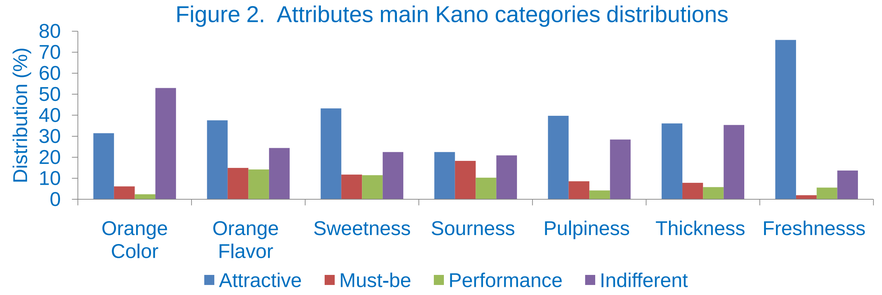
Overall, orange color was classified as “indifferent” and other attributes, i.e. orange flavor, sourness, sweetness, pulpiness, thickness and freshness were identified as “Attractive” (Table 2).

Attribute	Frequency distribution (%)						
	Attractive	Must-be	Performance	Indifferent	Reversal	Questionable	Total
Orange Color	31.4	6.2	2.4	53.0	1.3	5.7	100
Orange Flavor	37.6	14.9	14.2	24.4	1.8	7.1	100
Sweetness	43.3	11.8	11.5	22.5	2.0	9.0	100
Sourness	22.5	18.3	10.3	20.9	6.1	22.0	100
Pulpiness	39.7	8.6	4.2	28.5	4.3	14.7	100
Thickness	36.1	7.8	5.8	35.4	2.7	12.2	100
Freshnesss	75.8	2.0	5.6	13.7	0.7	2.1	100

Table 2. Attributes Kano category distributions

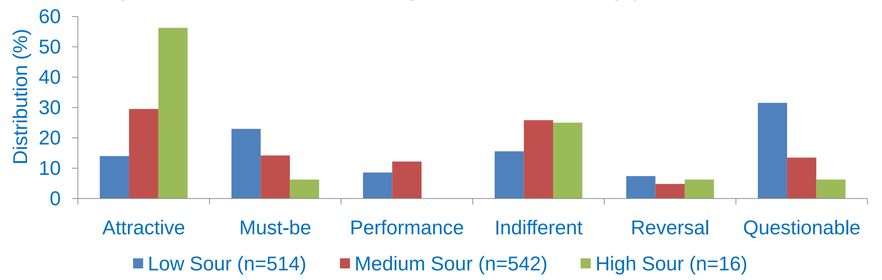
There were 75.8% of consumers who considered freshness as an “Attractive” attribute. This reflected consumer preference and low expectation for freshness performance with current commercial products. By contrast, categorization of sourness, pulpiness and thickness were not uniform among consumers, some characterizing them as “Attractive” and others as “Indifferent” (Figure 2).

Figure 2. Attributes main Kano categories distributions



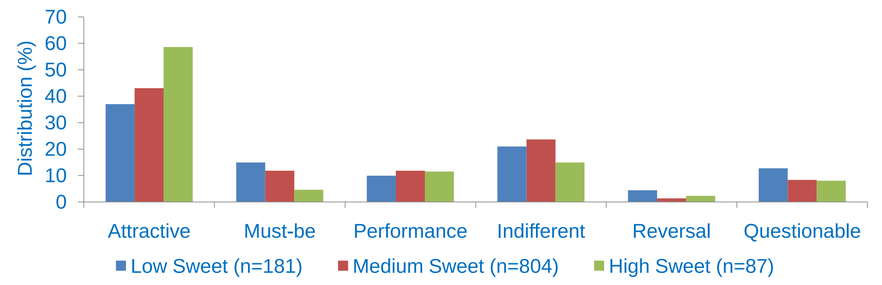
Sourness was a “Must-be” attribute for low sour consumers and an “Attractive” attribute for medium and high sour consumers. The high proportion of “Questionable” classification for low sour consumers is a challenge to the efficiency of this research method. The high proportions of “Indifferent” classification by medium and high sour consumers indicated their flexibility on sourness quality (Figure 3).

Figure 3. Sourness Kano categories distributions by preference levels



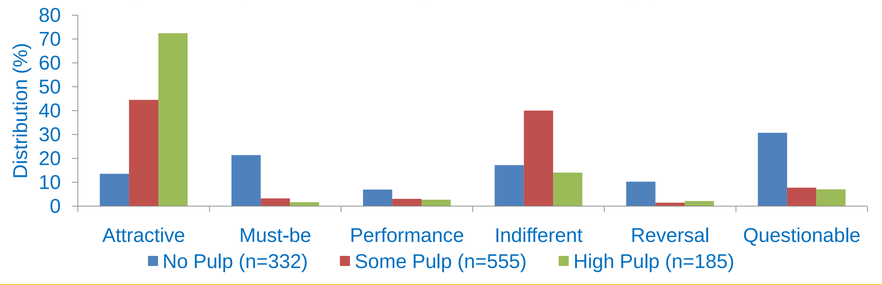
Sweetness was identified as “Attractive” across sweetness preference levels. Similar to sourness, the relatively high proportions of “Indifferent” ratings across groups reflected a broad range of acceptable sweetness levels by some consumers (Figure 4).

Figure 4. Sweetness Kano categories distributions by preference levels



The high proportion of ”Questionable” ratings for pulpiness by no pulp consumers suggested a strong dislike for pulp or potential confusions with the questionnaire. The comparable proportions of “Attractive” and “Indifferent” ratings by some pulp consumers indicated significant differences among panelists as to the importance of pulpiness. High pulp consumers classified pulpiness as an attractive attribute (more than 70%) significantly more than others (Figure 5).

Figure 5. Pulpiness Kano categories distributions by preference levels



CONCLUSIONS

1. Orange color was an “Indifferent” attribute and other attributes of interest were identified as “Attractive” by the consumers in this research.
2. Questionnaire design is a challenging task in the classic Kano methodology, especially for those negative or relatively ambiguous attributes.
3. The development of a new data analysis tool is expected to improve the efficiency of Kano attribute classification.

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