A critical review of techniques for classifying quality attributes in the Kano model

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Abstract

Purpose – The purpose of this paper is: to review the most commonly used approaches to the classification of quality attributes according to the Kano model; to identify the theoretical/practical strengths and weaknesses of these techniques; and to provide guidance for future research and managerial practice in this area.

Design/methodology/approach – Based on an extensive review of the literature on the Kano model and the relevant marketing/management literature, five approaches (Kano’s method; “penalty-reward contrast analysis”; “importance grid”; qualitative data methods; and “direct classification”) are evaluated in terms of their validity and reliability for categorising attributes in the Kano model. Several illustrative examples provide empirical evidence for the theoretical arguments advanced in the study.

Findings – The Kano questionnaire and the direct-classification method are the only approaches that are capable of classifying Kano attributes in the design stage of a product/service. Penalty-reward contrast analysis (PRCA) is useful for assessing the impact of product/service attributes on overall satisfaction with a product/service, but its applicability to the classification of Kano attributes is questionable. The importance grid (IG) is not recommended for use with the Kano model. The critical incident technique and the analysis of complaints/compliments are valid for the Kano model, but have questionable reliability.

Originality/value – The study makes some important points about accurate semantic terminology in describing issues related to the Kano model. In particular, researchers should be aware that an attractive quality element (must-be quality element, respectively) might in fact be a dissatisfier (satisfier, respectively), due to significant conceptual differences between performance in terms of the Kano model (i.e. objective performance) and subjective performance perceptions.

Keywords Quality management, Classification, Critical incident technique, Marketing models, Customer satisfaction

Paper type General review

1. Introduction

Since its introduction in the 1980s, Kano’s model of attractive quality (Kano et al., 1984) has become one of the most popular quality models among marketing/management practitioners and researchers in a wide range of industries. The Kano model abandons a strictly linear view of the impact of product/service attribute-performance on customer satisfaction in favour of identifying the particular attributes that have the potential to elicit customer satisfaction/delight and/or dissatisfaction/frustration.

As the Kano model has become more popular, various conceptual approaches have been suggested for classifying quality attributes in the model. Examples include:

- Kano’s method;
- the “penalty-reward contrast analysis”;
Several authors have conducted empirical comparisons of two or more of these approaches (Matzler and Sauerwein, 2002; Fuchs and Weiermair, 2003; Busacca and Padula, 2005; Bartikowski and Llosa, 2004; Witell and Lofgren, 2007). However, the results have been mixed and no consensus has emerged on the most appropriate approach. The purpose of the present study is, therefore, to build on the findings of these empirical studies with a view to providing guidance to researchers and managers in choosing and applying an appropriate approach for their needs.

In pursuing this objective, the present study does not attempt to conduct a comprehensive empirical comparison of the various approaches to attribute classification in Kano’s model because it is not possible to make comparative assessments of validity and reliability of particular methods/techniques unless it is known that at least one of them provides reliable and valid results (and unless it is known which provides such “true” results). Moreover, it would be very difficult to test all the approaches using the same sample of respondents and identical product/service settings.

The evaluation of the various approaches in this study therefore proceeds on the basis of a comparative critique of their apparent strengths and weaknesses. In particular, the following three issues are addressed:

1. the validity and reliability of the approaches (in terms of their theoretical foundations);
2. the informational value of the results provided by each approach (in terms of what exactly is being assessed); and
3. the technical strengths and weaknesses of the approaches (in terms of their methodologies).

The findings of this study have practical application in assisting researchers to:

- choose the most appropriate approach in a particular research setting;
- interpret the results obtained through the various approaches; and
- apply the various approaches in a technically appropriate manner.

The study also addresses several theoretical problems by identifying a number of terminological and conceptual issues that require resolution if theory development in this area is to be advanced.

The remainder of the paper is organised as follows. The first of five approaches (Kano’s method) is discussed in section 2. The “penalty-reward contrast analysis” is then examined in section 3. The “importance grid” is assessed in section 4, and qualitative data methods are analysed in section 5. The last of the five approaches, the “direct classification method”, is discussed in section 6. A summary of the merits and deficiencies of the main approaches is presented in section 7. The paper concludes with a discussion of the main findings and implications.
2. Kano’s method

The original creators of the Kano model provided their own approach to classifying quality attributes using a structured questionnaire consisting of pairs of questions for each attribute of a given product/service (Kano et al., 1984). One question in each pair asks about the consumer’s feelings in the case of fulfilment of an attribute (a so-called “functional question”) and the other question asks about feelings in the case of non-fulfilment of an attribute (“dysfunctional question”). The data are then analysed by means of a special evaluation table, which results in a categorisation of attributes for each respondent (see Figure 1). Frequencies of single-respondent categorisations are then used to provide the final classification of attributes.

![Image of the Kano method]

**Figure 1.**
The Kano method

**Notes:** A = attractive; M = must-be; O = one-dimensional; R = reverse; Q = questionable; I = indifferent

**Source:** According to Kano et al. (1984)
Numerous studies have employed the Kano method, particularly in the field of total quality management (TQM), in which Kano classifications have been used to adjust improvement ratios in quality-function deployment (Franceschini and Terzago, 1998; Matzler and Hinterhuber, 1998; Tan et al., 1999; Shen et al., 2000; Tan and Shen, 2000; Tan and Pawitra, 2001; Pawitra and Tan, 2003; Lee et al., 2008; Baki et al., 2009). To improve the original methodology, several authors have modified the wording of the questions and/or the answers (Schvaneveldt et al., 1991; Tontini, 2000; Chen and Lee, 2009). Others have modified the subcategories of the original Kano categories (Shahin and Zairi, 2009).

The rationale of the Kano method is logically valid for assessment of customer feelings regarding a particular product/service attribute if the fulfilment (or non-fulfilment) of that attribute is clearly defined. However, a significant problem can emerge if the definitions of “fulfilment” and “non-fulfilment” are imprecise. For example, some authors frequently refer to quality attributes as being “attractive” if they elicit customer satisfaction when delivered, but do not cause dissatisfaction when they are not delivered; however, the same authors sometimes refer to attributes as being “attractive” if they have a greater positive impact on customer satisfaction when their performance is high than their negative impact when their performance is low (Fuchs and Weiermair, 2004; Matzler et al., 2004a, b; Füller and Matzler, 2008). Moreover, some authors even combine these definitions and describe quality attributes as “attractive” if they cause customer satisfaction when they “are present or have sufficient performance”, but do not cause dissatisfaction when “not present or their performance is insufficient” (Tontini and Silveira, 2007, p. 486). It is thus being implicitly assumed that consumers’ evaluations of a given attribute in terms of provision/non-provision are the same (or at least similar) to consumers’ evaluations of the same attribute in terms of high/low attribute-performance. Acceptance of this assumption implies that the Kano method provides the same (or at least similar) categorisations of attributes regardless of whether “fulfilment” and “non-fulfilment” are defined in terms of presence or defined in terms of performance.

To test the veracity of this assumption, the present study conducted a small indicative survey using the example of a mobile banking service (that is, an internet-based banking service delivered by mobile phone) as a feature of a new bank account. Two sets of questions were asked in this indicative survey of 129 undergraduate students attending a market research class. The first set of questions referred to the provision/non-provision of this feature:

- **Q1a: functional**: “When opening a new bank account, how would you feel if you were provided with a mobile banking service?”
- **Q2a: dysfunctional**: “When opening a new bank account, how would you feel if you were not provided with a mobile banking service?”

The second set of questions referred to the performance/non-performance of the feature:

- **Q1b: functional**: “When opening a new bank account, how would you feel if you were provided with a mobile banking service that works very well?”
- **Q2b: dysfunctional**: “When opening a new bank account, how would you feel if you were provided with a mobile banking service that works very poorly?”

The results of this brief questionnaire are provided in Table I.
It is apparent from this illustrative example that the classification of the attribute varied significantly – depending on how “fulfilment” was defined and operationalised. When “fulfilment” was understood in terms of provision of the attribute, the mobile banking service was classified as an “attractive” element, whereas when it was understood in terms of performance, it was classified as a “must-be” element. Given that t-tests showed that both classifications were statistically significant at the 10 per cent level, this failure to categorise the attribute consistently raises questions about the reliability and validity of this first approach (the Kano method) as a means of categorising attributes in the Kano model.

Nevertheless, interpretation of these apparently divergent results should take at least two factors into consideration. First, it is acknowledged that the second (performance-based) operationalisation of the notion of “fulfilment” involved leading questions about performance that were likely to have caused significant response bias. Second, it is acknowledged that the two sets of questions presented quite different situations to the respondents – in that the first implied that the proposed new attribute will perform well, whereas the second explicitly allowed for the possibility that it might perform well or poorly. These different hypothetical situations are likely to elicit quite different responses, and, consequently, different attribute-categorisations.

To overcome these difficulties, it should be recognised that the key issue that determines the Kano category of an attribute is not the performance of that attribute; rather, it is actually the provision (or non-provision) of a more-or-less expected benefit. It should also be recognised that the Kano model is talking in terms of objective performance (e.g. size, weight, remote distance of a remote-control), and that low objective performance (a heavy remote control), does not have to be perceived as low performance by customers at a given point in time (e.g. when remote-controls were first introduced)! Accordingly, using the Kano method with performance-based operationalisations of “fulfilment” and “non-fulfilment” could make assessments of the different Kano-categories unreliable. To further increase the reliability of attribute categorisations, Kano’s method should refer to the provision (or non-provision) of the benefits to be expected through the provision of an attribute rather than the provision of the attribute itself. Using the example of the mobile banking service, the questions should therefore be formulated as follows:

- **Q1c: functional:** “When opening a new bank account, how would you feel if you were provided with the possibility of managing your bank transactions via your mobile phone?”
- **Q2c: dysfunctional:** “When opening a new bank account, how would you feel if you were not provided with the possibility of managing your bank transactions via your mobile phone?”

<table>
<thead>
<tr>
<th>Mobile banking service</th>
<th>A</th>
<th>M</th>
<th>O</th>
<th>R</th>
<th>Q</th>
<th>I</th>
<th>Total</th>
<th>Category</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision/non-provision</td>
<td>59</td>
<td>10</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>41</td>
<td>129</td>
<td>A</td>
<td>0.061</td>
</tr>
<tr>
<td>High/low performance</td>
<td>22</td>
<td>49</td>
<td>36</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>129</td>
<td>M</td>
<td>0.016</td>
</tr>
</tbody>
</table>

**Note:** Based on different wording of questions: provision-based wording; performance-based wording.
Questions expressed in this way would provide a valid and reliable tool for assessing customer feelings regarding the provision (or non-provision) of a given attribute and the benefits provided through it. However, a disadvantage of the technique is that it does not provide insight into the potential of that attribute to influence overall customer satisfaction, as opposed to satisfaction with the attribute itself. For example, this technique might reveal that the mobile banking service has greater potential to create satisfaction than dissatisfaction (that is, it is an “attractive” quality attribute), but the technique does not reveal how important this attribute is in the customer’s overall judgment of the bank account, nor how it relates to other attributes in this regard. This is a significant disadvantage of this technique because such information can be important for effective decision-making when designing and/or improving products/services.

Nevertheless, Kano’s method retains certain advantages over other approaches. First, it does not require the customer to have had experience with the attributes that are being classified. Second, in contrast to other available approaches (except the “direct classification approach”, which is discussed later), the Kano method has no technical limitations regarding the number of attributes that can be analysed.

### 3. Penalty-reward contrast analysis

Although the technique of “penalty-reward contrast analysis” (PRCA) was originally developed by Brandt (1987) to identify value-enhancing attributes in the specific context of transportation services, the PRCA approach has subsequently become a frequently used technique for classifying Kano attributes in a wide range of industries (Matzler and Sauerwein, 2002; Ting and Chen, 2002; Fuchs and Weiermair, 2003; Bartkowski and Llosa, 2004; Conklin et al., 2004; Fuchs and Weiermair, 2004; Matzler et al., 2004a, b; Busacca and Padula, 2005; Füller et al., 2006; Matzler and Renzl, 2007; Füller and Matzler, 2008; Alegre and Garau, 2009; Mikulić and Prebežac, 2010).

The technique analyses the impact of very high and very low attribute performance on overall satisfaction using regression analysis with two sets of dummy variables for each attribute. One set is obtained by coding the lowest attribute performance as “1”, whereas all other ratings of attribute performance are coded as “0”. The second set is obtained by coding the highest attribute performance as “1”, whereas all other ratings of attribute performance are coded as “0”. The two dummy sets are then regressed against a measure of overall satisfaction, resulting in two regression coefficients (RCs) for each attribute. The first RC quantifies an attribute’s penalty (that is, the attribute’s negative impact on overall satisfaction when performing very poorly), whereas the second RC quantifies an attribute’s reward (that is, the attribute’s positive impact on overall satisfaction when performing very well). A comparison of the two RCs then reveals whether an attribute has a positive or negative impact on overall satisfaction. Moreover, the total of the absolute value of the penalty RC and the reward RC can be utilised to obtain a measure of the range of attribute impact on overall satisfaction, thus indicating an attribute’s importance in explaining the customer’s overall judgment of the product/service (Mikulić and Prebežac, 2008).

Most authors use multiple regression analysis (MRA) in PRCA, although Shapley value regression has been used in one study (Conklin et al., 2004), and bivariate regressions have been used in another study (Ting and Chen, 2002). The use of MRA in PRCA means that the technique is usually applied to a smaller set of attributes than
other techniques (such as the Kano method or the “importance grid”) because MRA has limitations in analysing larger numbers of variables due to the problem of multicollinearity. To circumvent this problem, some authors factor analyse the data before applying PRCA (Matzler et al., 2004b; Füller et al., 2006; Füller and Matzler, 2008). However, this is less than optimal because it does not facilitate detailed analysis of individual attributes of products/services; moreover, factor analysis is not necessarily a valid approach because the input data for PRCA are obtained from customer-satisfaction surveys, which frequently treat attributes as formative indicators, rather than correlated factors.

Ting and Chen (2002) sought to circumvent the multicollinearity-problem by using a bivariate approach, which facilitates analysis of any desired number of attributes; however, bivariate regressions are limited because the impact of all other attributes is neglected when calculating a given attribute’s impact on overall satisfaction.

An alternative approach to the problem of multicollinearity was proposed by Mikulić and Prebežac (2009), whose hierarchical attribute model kept the number of regressors in an equation at a reasonable level by splitting up products/services into their main components, and each component into a smaller number of attributes. The attributes were then regressed against the respective component-satisfaction scores to reveal asymmetric effects within each component, whereas component-satisfaction was regressed against overall satisfaction with the product/service to reveal asymmetries at the product/service level.

Another important issue to consider when using PRCA is that differences in expectations among different customer segments can cause variations in perceptions of attribute performance that do not accord with objective variations in the performance of various attributes. As a consequence, Füller and Matzler (2008) have suggested that researchers should consider a segment-based approach when interpreting PRCA results.

A neglected technical issue in PRCA is the widespread use of standardised RCs in PRCA studies (Matzler and Sauerwein, 2002; Fuchs and Weiermair, 2003; Fuchs and Weiermair, 2004; Matzler et al., 2004a; Matzler and Renzl, 2007; Füller and Matzler, 2008; Mikulić and Prebežac, 2008). This is despite evidence that such variables skew the information held in the original unstandardised variables – unless the dummy variables have equal distributions of ones and zeros, which would imply they have the same arithmetic means and standard deviations (Fox, 1997). To meet this condition, performance data for each attribute would have to cover the same frequencies of lowest and highest performance-scores. However, because this condition is rarely met, standardised and unstandardised RCs are likely to have quite different implications. An illustrative example is provided in Table II. The data were gathered from a survey on airline customer satisfaction (n = 997). Attribute performance and overall satisfaction were measured on seven-point Likert scales. Only lowest and highest AP scores were coded into dummy variables (that is, AP = 1 and 7).

The results reveal that only one attribute shows the same direction of impact-asymmetry for both types of RCs (flight experience). Given these divergent results, it is strongly recommended that standardised dummy RCs should not be used in PRCA because they are likely to have misleading implications.

In summary, when PRCA is used properly it is a reliable approach for analysing asymmetries in the relationship between subjective perceptions of attribute
performance and overall satisfaction with a product/service. Compared with the Kano method, PRCA has advantages and disadvantages. Its advantage is that it can be used to discriminate among attributes in terms of their relative importance in explaining a customer’s overall judgment of a product/service; conversely, its disadvantage is that, unlike the Kano method, it cannot be used to analyse attributes that do not yet exist.

Nevertheless, the conceptual validity of PRCA as a Kano classification method is questionable because PRCA analyses the relationship between attribute performance and overall satisfaction, whereas the Kano model analyses the relationship between attribute performance and attribute satisfaction. Although it could be argued that overall satisfaction is a proxy measure of attribute satisfaction, doubts remain about the conceptual validity of PRCA as a Kano classification tool – because the Kano model purports to describe objective attribute performance, whereas the PRCA relies on subjective perceptions of attribute performance. Although these can converge under certain circumstances, it is clear that the Kano model and the PRCA do not assess the same things. Indeed, it seems more appropriate to refer to the categories of attributes under PRCA as “satisfiers”, “dissatisfiers”, and “hybrids”, rather than using the classifications of the Kano model. This distinction is suggested because the conceptual differences between objective attribute performance and subjective attribute performance mean that an “attractive” quality attribute under the Kano model might, in theory, be a “dissatisfier” under PRCA, and a “must be” quality attribute under the Kano model might, in theory, be a “satisfier” under PRCA.

4. “Importance grid”
The “importance grid” (IG), which was developed by an IBM consultant as an analytical tool for classifying quality attributes in the Kano model, was first cited in the scholarly literature by Vavra (1997). Since then it has been applied to a variety of products (Matzler and Hinterhuber, 1998; Yang, 2005; Riviere et al., 2006) and services (Martensen and Gronholdt, 2001; Fuchs, 2002; Fuchs and Weiermair, 2003, 2004; Matzler et al., 2003; Bartikowski and Llosa, 2004; Busacca and Padula, 2005).

The IG compares explicit and implicit “attribute importance” (AI) to classify attributes. Explicit AI is obtained directly from the customer (through direct ratings or

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Unstandardised coefficients</th>
<th>Standardised coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Penalty</td>
<td>Reward</td>
</tr>
<tr>
<td>Flight offer</td>
<td>-0.431 *</td>
<td>0.344 **</td>
</tr>
<tr>
<td>Ticket purchase experience</td>
<td>-0.827 *</td>
<td>0.675 ***</td>
</tr>
<tr>
<td>Flight experience</td>
<td>-0.510 *</td>
<td>1.158 ***</td>
</tr>
<tr>
<td>Price</td>
<td>-1.186 ***</td>
<td>0.710 ***</td>
</tr>
<tr>
<td>Ontime performance</td>
<td>-0.721 **</td>
<td>0.722 ***</td>
</tr>
</tbody>
</table>

Notes: *p < 0.05; **p < 0.01; ***p < 0.001; \( R^2 = 5.41 \); Adjusted \( R^2 = 0.532 \); Dependent variable = overall satisfaction

Table II. Unstandardised vs standardised regression coefficients in PRCA

Classifying quality attributes

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rankings), whereas implicit AI is statistically derived by regressing or correlating attribute performance against a global performance measure (such as overall satisfaction). Most authors have used standardised beta coefficients from MRA (Fuchs, 2002; Matzler and Sauerwein, 2002; Matzler et al., 2002; Busacca and Padula, 2005; Peters, 2005) or partial correlation coefficients (Matzler et al., 2002, 2003; Fuchs and Weiermair, 2003, 2004; Bartikowski and Llosa, 2004), although some authors have utilised Pearson- or Spearman rank-order correlation coefficients (Matzler et al., 2002).

To classify the attributes, the measures of explicit AI and implicit AI are used to construct a two-dimensional grid, which is divided into four quadrants using grand means of implicit and explicit AI scores as thresholds. By noting the positions of attributes on this grid, the analysis purports to reveal the various Kano factors as follows:

1. “must-be” attributes have high (above average) explicit AI, but low (below-average) implicit AI;
2. “attractive” attributes have low explicit AI, but high implicit AI;
3. “one-dimensional” attributes with high importance have high explicit AI and high implicit AI; and
4. “one-dimensional” attributes with low importance have low explicit AI and low implicit AI.

Several authors have questioned the validity of the IG technique because there is no theory that explains why the different Kano factors can be identified by comparing explicit AI with implicit AI (Matzler and Sauerwein, 2002; Fuchs and Weiermair, 2003; Busacca and Padula, 2005). In particular, the implicit assumption that the different Kano categories can be identified by comparing the relative grid positions of attributes means that the categorisation of any given attribute is dependent on all the other attributes as reference points. This has two logical consequences. First, the IG will always yield a classification of attributes into all of the various Kano categories (“must-be”, “attractive”, and “one-dimensional”) whenever there are any differences in explicit and implicit AI (which is usually the case); however, it is doubtful that every set of analysed attributes always covers every Kano category. Second, a given attribute’s position on the grid (and hence its Kano categorisation) can change if the set of analysed attributes is modified; however, according to the Kano model, the categorisation of a given attribute should be objectively defined and consistent across any set of attributes.

Figures 2 and 3 illustrate how the choice of analysed attributes can influence IG results. Both IG “A” (Figure 2) and IG “B” (Figure 3) are based on the same data on airline customer satisfaction, with the only difference being that IG “B” encompasses one more attribute than IG “A”.

It is apparent that the “ticket purchase experience” is classified as a “one-dimensional” attribute in IG “A”, but as a “must-be” attribute in IG “B”. Moreover, “price” is an “attractive” attribute in IG “A”, but a “one-dimensional” attribute in IG “B”. This example demonstrates that the IG is an unreliable technique for classifying attributes into predefined Kano categories.

Despite these problems, the IG technique does have some merit. First, explicit AI can be regarded as an indicator of expectations with regard to attributes (Lambert and...
Lewis, 1990). This is in accordance with the spirit of the Kano model, which holds that “attractive” attributes are less expected, whereas “one-dimensional” and “must-be” attributes are more expected. Second, implicit AI is an indicator of an attribute’s impact on customer satisfaction, which would also seem to be in the spirit of the Kano model, which holds that “attractive” attributes and “one-dimensional” attributes have a significant impact on satisfaction, whereas “must-be” attributes have less impact on satisfaction. However, it should also be noted that Kano’s model holds that “one-dimensional” attributes and “must-be” elements also have a significant impact on dissatisfaction, which is a problem for the IG technique because implicit AI indicates an attribute’s potential to impact overall satisfaction (ranging from very dissatisfied to very satisfied). As a consequence, because implicit AI does not reveal whether the impact of a given attribute is stronger towards satisfaction or dissatisfaction, a measure that indicates the asymmetry of impact is required. Such a measure has been introduced by Mikulić and Prebežac (2008); however, with regard to the applicability of the IG as a Kano assessment tool, this does not address the problem of how objective attribute performance is to be reliably operationalised and the problem that the technique analyses the relationship between attribute performance and overall satisfaction, rather than the relationship between attribute performance and attribute satisfaction.

In summary, the IG cannot be regarded as a reliable approach for assessing attributes into absolute categories in the Kano model. However, as Bartikowski and Llosa (2004) have contended, it could serve as an advanced version of the importance-performance analysis (Martilla and James, 1977). Because the IG uses both

![Image](image-url)

**Figure 2. Importance-grid “A”**

Notes: Scores of implicit importance are unstandardized regression coefficients; dependent variable = OCS with the airline; $R^2 = 0.531$; significance of all attributes: $p < 0.001$
5. Qualitative data methods

The “two-factor theory” of work satisfaction/work dissatisfaction and the critical incident technique (CIT) (Herzberg et al., 1959) have been widely adopted by authors to explore the notion that there are attributes that are primarily satisfying and attributes that are primarily dissatisfying in various products (Hausknecht, 1988; Maddox, 1981; Swan and Combs, 1976) and services (Bitner et al., 1990; Johnston and Silvestro, 1990; Silvestro and Johnston, 1990; Smith et al., 1992; Stauss and Hentschel, 1992; Johnston, 1995). In a similar vein, other authors have applied the technique of “analysis of complaints and compliments” (ACC) for the same purpose (Cadotte and Turgeon, 1988; Oliver, 1997; Friman and Edvardsson, 2003). Although these various studies did not refer directly to the Kano model, several authors refer to both CIT and ACC as qualitative data-based approaches for application in the Kano model (Matzler et al., 2002; Matzler and Sauerwein, 2002).

The basic assumption in applying CIT and ACC to the Kano model is that quality attributes can be categorised by comparing how frequently customers mention an attribute in a positive context or a negative context. In summary:

Figure 3.
Importance-grid “B”

Notes: Scores of implicit importance are unstandardized regression coefficients; dependent variable = OCS with the airline; $R^2 = 0.566$; significance of all attributes: $p < 0.001$
If the number of negative incidents/complaints significantly exceeds the number of positive incidents/compliments, the attribute is categorised as a “must-be” attribute.

If the number of positive incidents/compliments significantly exceeds the number of negative incidents/complaints, the attribute is categorised as an “attractive” attribute.

If the number of positive incidents/compliments and the number of negative incidents/complaints are approximately equal, the attribute is categorised as a “one-dimensional” attribute.

The theoretical assumptions in applying these techniques to the Kano model appear to be appropriate. In essence, the theory is that “must-be” attributes prevail in negative contexts because they have greater potential to cause dissatisfaction than satisfaction, whereas “attractive” elements prevail in positive contexts because they have a greater potential to cause satisfaction than dissatisfaction. However, in practice, a significant limitation of these techniques is that they do not allow researchers to determine which attributes are to be categorised because the attributes for consideration emerge only from the customers’ comments.

It is noteworthy that CIT and ACC are the only approaches under consideration in the present study that externally validate the assumptions of the Kano model – that is, they begin with delight/frustration and analyse what caused it, whereas the Kano method assumes fulfilment/non-fulfilment and analyses the consequent customer feelings (satisfaction or dissatisfaction). However, as noted above, it is theoretically possible that “attractive” attributes are “dissatisfiers” that cause frustration and that “must-be” attributes are satisfiers that cause delight. Thus, in order to make inferences about the reliability of these techniques for categorising attributes in the Kano model it would be important to know whether delight/frustration is primarily a result of extraordinary performance/failure of a more-or-less expected attribute, or whether it is a result of low/high expectedness of a provided benefit that is a necessary condition for an attribute to be an “attractive”/“must-be” attribute. Moreover, as Matzler et al. (2002) have noted, the fact that some attributes predominate in dissatisfying incidents/complaints, whereas others predominate in satisfying incidents/compliments, might be due to patterns of attribute performance in a particular research setting – in other words, the product or service under analysis might generally perform very well in some areas and very poorly in others. In these circumstances, such analyses might therefore be indicative, but in order to categorise the attributes reliably, the data would need to cover both very positive and very negative customer experiences with each attribute that emerges from the analysis. However, this might not always be achieved in case-based studies; indeed, given the methodological rationale of the techniques, it is usually impossible to ascertain whether there were positive customer experiences that did not cause compliments (or negative experiences that did not cause complaints) – although reliability certainly increases when studies are based on multiple cases.

In summary, the reliability of both the CIT and ACC to classify attributes in the Kano model remains questionable. Nevertheless, the managerial value of the results remains high if the objective of the research is to identify active and/or salient sources of satisfaction (“satisfiers”) and dissatisfaction (“dissatisfiers”) in a particular product/service setting.
6. Direct classification

A simple method of direct classification of attributes according to the Kano model was proposed by Emery and Tian (2002), who suggested that the theory of attractive quality should be explained to respondents, who would then themselves classify attributes into the various Kano categories. A similar two-step direct-classification approach, termed the “force-choice classification method”, was suggested by Shen et al. (2000). As a first step, respondents were asked to classify product/service attributes into the three main Kano categories (“attractive”, “must-be”, and “one-dimensional”), followed by a second step in which respondents refined the classification by sub-categorising attributes into “somewhat attractive/basic”, “moderately attractive/basic”, and “very attractive/basic” quality attributes.

Such direct classification is the only approach that does not rely on an indirect assessment of the various Kano categories on the basis of implicit assumptions. Moreover, reliability problems can occur only if the researcher does not explain the theory well and/or the respondents do not understand it well. As with the first technique examined in the present study (the Kano method), the advantages of direct classification are:

- that it can be used to classify both existing and non-existing attributes; and
- that it has no technical limitations regarding the number of attributes that can be analysed.

However, the practical disadvantages of the direct-classification approach are that explaining the theory to respondents can be time-consuming and it can be difficult for some respondents to understand it.

In summary, the disadvantages of the approach mean that the applicability of direct classification in typical customer-satisfaction surveys is limited, and reliability problems can occur. Given that the Kano method does not require special training for either interviewers or respondents, it would appear to be preferable to the direct-classification method.

7. Summary of findings

Table III provides a summary of the approaches in terms of:

- what is being assessed in each;
- the validity of each as a means of categorising attributes in the Kano model; and
- the reliability of each.

8. Conclusions and implications

8.1 Implications for researchers

A key finding of this study is that the reliability and validity problems of most of the approaches to attribute classification in the Kano model derive from differences between:

- the concept of objective attribute-performance (AP), as described in the Kano model; and
- the concept of subjective AP-perception, which is commonly used in attempts to operationalise the Kano model.

Several important implications emerge from this conceptual difference.
First, given that the temporal dimension is firmly incorporated in the Kano model, AP-perceptions of the same levels of objective AP can differ significantly at various points in time. For example, a large and bulky remote control for a television (having low objective AP according to the Kano model) might not have been perceived as performing poorly in the 1950s when remote controls were first introduced; however, the same remote control would be likely to yield low AP-ratings in a consumer survey conducted today. It is thus apparent that objective AP and subjectively perceived AP are not equivalent concepts – because objective AP is free from chronological influences, whereas subjective AP-perceptions are strongly time-dependent (as a consequence of changes in customer expectations, familiarity with a product/service, product/service innovations, and so on).
Second, although the range of possible customer reactions to obtained objective AP is pre-determined by an attribute’s degree of evolution according to the Kano model (that is, by its Kano category), the range of possible customer reactions to perceived AP is in no way determined by an attribute’s Kano category. For example, although a remote control was an attractive attribute of a television in 1983 (Kano, 2001), there is no reason to assume that a consumer in those times might not have been very dissatisfied with the remote control (perhaps because it malfunctioned), or that a consumer in 2010 might not be very satisfied (perhaps because it has an appealing design) – despite it being a “must-be” element. It is thus apparent that “attractive” attributes can in fact be “dissatisfiers” (that is, they cause greater dissatisfaction than satisfaction), and that “must-be” elements can be “satisfiers”. It is therefore important that these terms not be used synonymously (which is, unfortunately, very common in the extant literature).

Third, it is apparent from the above example that an “attractive” attribute can, in fact, cause dissatisfaction because its AP is perceived to be low. As a consequence, certain definitions of “attractive” attributes in the literature that do ostensibly apply to the Kano model (which speaks in terms of objective AP) are not necessarily applicable to the real world (which is perceived subjectively). Examples of such definitions include:

- “increase customer satisfaction if delivered” (Fuchs and Weiermair, 2004, p. 217);
- do not cause dissatisfaction when “not fulfilled” (Nilsson-Witell and Fundin, 2005, p. 157); and
- “when not present or their performance is insufficient” (Tontini and Silveira, 2007, p. 486).

Similar comments hold for common definitions of “must-be” attributes and “one-dimensional” attributes. As a consequence, attempts to operationalise the Kano model by analysing how subjective AP-perceptions are related to resulting customer reactions (satisfaction/dissatisfaction) cannot be considered reliable.

Fourth, analyses of how objective AP is related to resulting customer reactions would be reliable and theoretically valid for categorisation in the Kano model. However, because objective AP is typically a vague concept that encompasses several characteristics of a feature (for example, size of a remote control, its weight, power consumption, remote distance, and so on), it might be impossible to measure the AP of a feature as a whole objectively – because such measures do not exist! In this regard, the Kano model seems to have a conceptual flaw – because the objective AP of a feature can often be described only in terms of the objective AP of the feature’s characteristics. This, however, shifts the focus to a lower level of abstraction which makes it possible to assess only whether the characteristics of the focal feature are “attractive”, “one-dimensional”, or “must-be” attributes. It is thus apparent that attempts to operationalise the Kano model by analysing how provided objective AP is related to resulting customer reactions can become an impossible task.

Finally, with regard to the relationship between objective AP and the various Kano categories, it should be recognised that the level of objective AP does not determine the Kano category of a feature, but only the degree of customer satisfaction/dissatisfaction which ranges between different boundaries for different
Kano categories. Moreover, with the evolution of a feature towards a “must-be” attribute, the level of attribute satisfaction associated with a particular level of objective AP becomes lower for all levels of objective AP. In fact, it is the provision/non-provision of a more-or-less expected and more-or-less useful customer benefit that determines the feature’s Kano category (for example, in the 1950s, this was the provision of a not-expected feature that enabled the viewer to change the channel without having to touch the television). Accordingly, in operationalising the Kano model, it is strongly recommended that use be made of a provision/non-provision-based mode of attribute fulfilment/non-fulfilment. Given the rationale of the Kano model, such a mode is not only valid, but also very reliable – due to the fact that its manifestations can easily be operationalised in an unequivocal and objective way (that is, provided/not-provided).

8.2 Implications for managers
Managers have a strong interest in identifying product/service features that are key drivers of customer satisfaction and dissatisfaction. In this regard, classifying product/service features according to the Kano model provides managers with valuable information that can be used in designing new products/services or in improving existing ones. However, managers should be aware that most of the commonly used approaches for classifying attributes in the Kano model have the potential to provide quite different categorisations of product/service attributes. Quality managers should therefore regard the various approaches as complementary, rather than as alternative approaches for the same purpose.

The study has shown that the Kano method is particularly useful in the design stage of a product/service because it facilitates categorisation of both existing and non-existing product/service attributes according to their potential to elicit satisfaction/delight and dissatisfaction/frustration. However, when using the Kano method, it is strongly recommended that a reasonable level of performance of the analysed attributes should be presumed, and that the customers’ feelings should be assessed in the case of provision and non-provision of the benefits provided through the attributes under consideration. A shortcoming of the Kano method, however, is that it does not reveal the relative importance of various attributes in the customer’s overall evaluation of the product/service, and/or how the analysed attributes relate to each other in this regard.

To obtain such information, a penalty-reward contrast analysis (PRCA) can provide insight. Although the validity of PRCA for categorisation of attributes in the Kano model is questionable, it does have considerable managerial value. For example, the PRCA quantifies penalties for low performance and rewards for high performance in terms of changes in overall satisfaction with a product/service. Moreover, penalties and rewards are comparable across attributes, and they can be totalled to obtain a measure of an attribute’s impact on overall satisfaction with a product/service. However, the PRCA can be applied only to existing attributes.

Managers should also be aware that the importance-grid (IG) cannot be regarded as a valid technique for use with the Kano model. However, in combination with data on attribute-performance, the IG can serve as an advanced importance–performance analysis to obtain relative improvement-priorities of attributes based on two different dimensions of attribute-importance.
Managers should also be aware that qualitative-data methods, such as the critical incident technique and the analysis of complaints and compliments, could provide valuable information about the most significant sources of customer satisfaction/dissatisfaction in a particular company/product/service setting. However, the reliability of these techniques for classifying attributes according to the Kano model is questionable because it is impossible to discern whether the analysed research setting covers both very positive and very negative customer experiences for all attributes that emerge from the analysis (but which did not result in complimenting/complaining behaviour).

Finally, direct classifications are certainly a valid approach to categorising attributes in the Kano model. However, the reliability of these methods depends on how well the interviewers explain the Kano model to respondents, and how well respondents understand the model. Given that the Kano method is also valid, but does not require special training of interviewers and respondents, it is recommended that the Kano method be preferred to direct classifications.

References


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