# THE KANO MODEL: HOW TO DELIGHT YOUR CUSTOMERS

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Which products and services can be used to obtain a high level of customer satisfaction? Which product features have a more than proportional influence on satisfaction, and which attributes are an absolute must in the eyes of the customer?

So far customer satisfaction was mostly seen as a one-dimensional construction - the higher the perceived product quality, the higher the customer's satisfaction and vice versa. But fulfilling the individual product requirements to a great extent does not necessarily imply a high level of customer satisfaction. It is also the type of requirement which defines the perceived product quality and thus customer satisfaction. Departing from Kano's model of customer satisfaction, a methodology is introduced which determines which influence the components of products and services have on customer satisfaction. The authors also demonstrate how the results of a customer survey can be interpreted and how conclusions can be drawn and used for the management of customer satisfaction is demonstrated.

## Kano's model of customer satisfaction

In his model, Kano (Kano, 1984) distinguishes between three types of product requirements which influence customer satisfaction in different ways when met:

*Must-be requirements*: If these requirements are not fulfilled, the customer will be extremely dissatisfied. On the other hand, as the customer takes these requirements for granted, their fulfillment will not increase his satisfaction. The must-be requirements are basic criteria of a product. Fulfilling the must-be requirements will only lead to a state of "not dissatisfied". The customer regards the must-be requirements as prerequisites, he takes them for granted and therefore does not explicitly

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demand them. Must-be requirements are in any case a decisive competitive factor, and if they are not fulfilled, the customer will not be interested in the product at all.
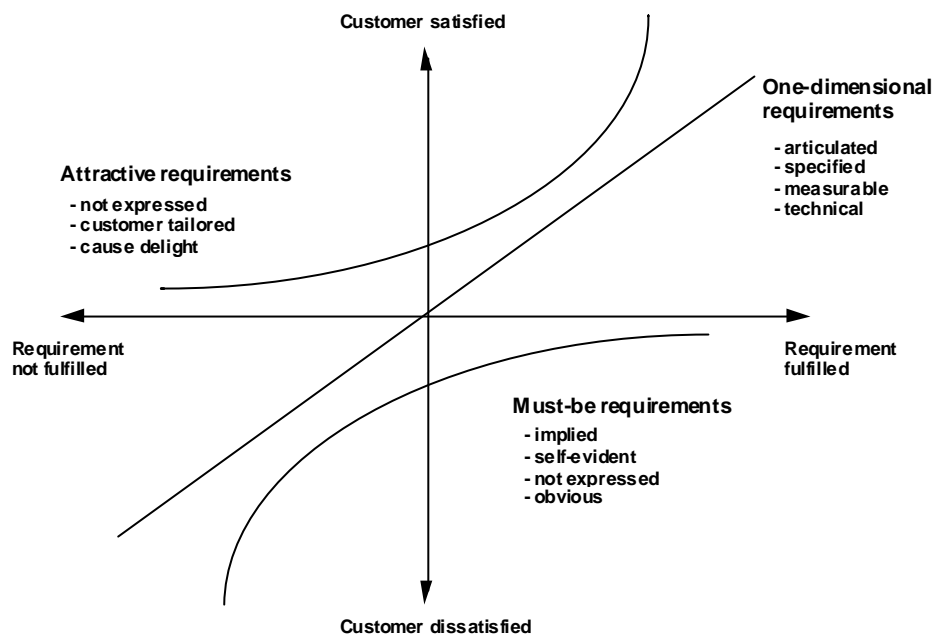
Fig. 1: Kano's model of customer satisfaction (Berger et al., 1993)

*One-dimensional requirements*: With regard to these requirements, customer satisfaction is proportional to the level of fulfillment - the higher the level of fulfillment, the higher the customer's satisfaction and vice versa. One-dimensional requirements are usually explicitly demanded by the customer.

*Attractive requirements*: These requirements are the product criteria which have the greatest influence on how satisfied a customer will be with a given product. Attractive requirements are neither explicitly expressed nor expected by the customer. Fulfilling these requirements leads to more than proportional satisfaction. If they are not met, however, there is no feeling of dissatisfaction.

The advantages of classifying customer requirements by means of the Kano method are very clear:

- priorities for product development. It is, for example, not very useful to invest in improving must-be requirements which are already at a satisfactory level but better to improve one-dimensional or attractive requirements as they have a greater influence on perceived product quality and consequently on the customer's level of satisfaction.

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- Product requirements are better understood: The product criteria which have the greatest influence on the customer's satisfaction can be identified. Classifying product requirements into must-be, one-dimensional and attractive dimensions can be used to focus on

- Kano's model of customer satisfaction can be optimally combined with quality function deployment. A prerequisite is identifying customer needs, their hierarchy and priorities (Griffin/Hauser, 1993). Kano's model is used to establish the importance of individual product features for the customer's satisfaction and thus it creates the optimal prerequisite for process-oriented product development activities.

- Kano's method provides valuable help in trade-off situations in the product development stage. If two product requirements cannot be met simultaneously due to technical or financial reasons, the criterion can be identified which has the greatest influence on customer satisfaction.

- Must-be, one-dimensional and attractive requirements differ, as a rule, in the utility expectations of different customer segments. From this starting point, customer-tailored solutions for special problems can be elaborated which guarantee an optimal level of satisfaction in the different customer segments.

- Discovering and fulfilling attractive requirements creates a wide range of possbilities for differentiation. A product which merely satisfies the must-be and one-dimensional requirements is perceived as average and therefore interchangeable (Hinterhuber/Aichner/Lobenwein 1994).

In the following we will explain how product requirements can be classified by means of a questionnaire. The ski industry, where more than 1500 customers were interviewed, is used to demonstrate how product requirements are ascertained, how a questionnaire is constructed, how the results are evaluated and interpreted and used as the basis for product development.

**Step one: Identification of product requirements - "Walk in you customer's shoes"**

The starting point for constructing the Kano questionnaire are the product requirements which have been determined in explorative investigations. Griffin/Hauser (1993) found that only 20 to 30 customer interviews in homogenous segments suffice to determine approximately 90 - 95% of all possible product requirements. Many market research institutes use focus group interviews to determine product requirements, assuming that group dynamic effects enable a greater number of

more diversified customer needs to be discovered. Compared with the expense, individual interviews seem to be more favourable. Customer interviews are useful for registering visible product requirements and customer problems, but when investigating potential *new* and *latent* product requirements they usually do not suffice. Especially attractive requirements are not expressed by the customer, as these are the features he does not expect.

*Analysing customer problems instead of customer desires*

If customers are only asked about their desires and purchasing motives in the exploratory phase, the results are usually disappointing and the answers already known. The product expectations mentioned by the customer are only the tip of the iceberg. It is necessary to ascertain the "hidden" needs and problems. A detailed analysis of the problems to be solved, of the conditions of application and the product environment can lead to instructive information on promising product developments.

The following four questions are of assistance when investigating customer problems (Shiba/Graham/Walden, 1993):

1. Which associations does the customer make when using the product x?
2. Which problems/defects/complaints does the customer associate with the use of the product x?
3. Which criteria does the customer take into consideration when buying the product x?
4. Which new features or services would better meet the expectations of the customer? What would the customer change in the product x?

Fig. 3: Identification of customer problems

The answers to the first question are generally of a very vague nature. Nevertheless, very interesting information may be gathered concerning the attitude towards a product, its field of application and purpose. When analysing the different general associations in connection with the use of the product, innovative product ideas may take shape.

The second question is designed to identify the desires and problems which so far have gone undetected. Uncontrollable sliding on icy and hard pistes, for instance, emerged as the most important problem for most skiers. By means of trapezoid ski construction, a ski manufacturer launched a technological innovation on the ski market with a product which had improved edge grip.

Furthermore, skiers often complain that it is arduous to carry the heavy skis from the car to the piste - a problem which is not directly connected with the actual use of the product, but can be found in its field of application and can be solved by using a lighter material in ski fabrication.

The answers to the third question usually coincide with the one-dimensional requirements of the product. These are the qualities which the customer demands explicitly.

The last question is used to identify those desires and expectations which the customer is aware of, but which have not yet been fulfilled by the current product range, such as being able to trade-in your old skis for a new model, or free service of edges and ski base once a year.

This extensive analysis of the desires and problems of the customer is generally an impressive source for potential improvements and new developments. The following figure shows the most imporant product criteria for skis gained by this method.

| Product requirements of skis | • Good edge grip on hard pistes<br>• Great ease of turn<br>• Good powder snow features<br>• Very light skis<br>• Integrated anti-theft device<br>• Scratch-resistant surface<br>• Design matches bindings and ski boots<br>• Free service of edges and base<br>• Trade-in offer for old skis<br>• Regular up-to-date information concerning test results, maintenance of ski and safety measures |
|---|---|

Fig. 4: Product requirements of skis

**Step two: Construction of the Kano questionnaire**

Must-be, one-dimensional and attractive requirements as well as product requirements towards which the customer is indifferent can be classified by means of a questionnaire.

For each product feature a pair of questions is formulated to which the customer can answer in one of five different ways (see also Kano,1984). The first question concerns the reaction of the customer if the product has that feature (functional form of the question), the second concerns his reaction if the product does not have that feature (dysfunctional form of the question).

When formulating the questions, the "voice of the customer" (Hauser/Clausing, 1988) is of prime importance. The "voice of the customer" is a description of the problem to be solved from the customer's viewpoint. If one asks about the technical solutions of a product, it can easily happen that

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the question is not correctly understood. The customer is not interested in *how* but *which* of his problems will be solved. In addition, if the solution to the technical problem is already provided in the formulation of the question, the engineers' creativity might well be restricted in the field of product development at a later date.
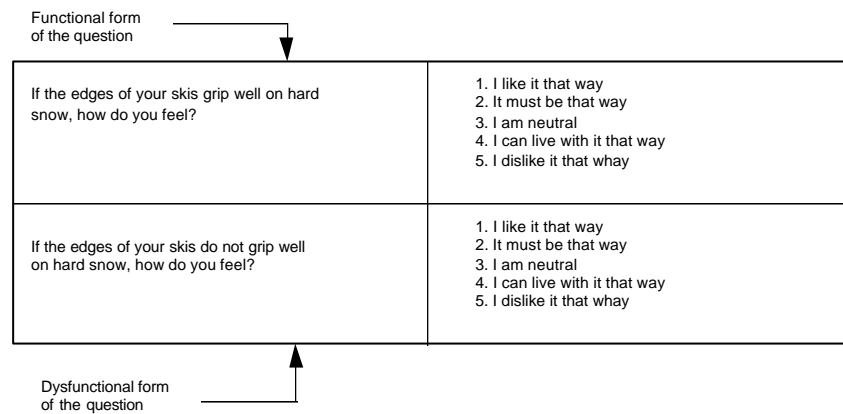


Fig. 5: Functional and dysfunctional question in the Kano questionnaire

By combining the two answers in the following evaluation table, the product features can be classified:



|  |  | Dysfunctional (negative) question | | | | |
|---|---|---|---|---|---|---|
| Customer requirements → | | 1. like | 2. must be | 3. neutral | 4. live with | 5. dislike |
| Functional (positive) question | 1. like | Q | A | A | A | O |
| | 2. must-be | R | I | I | I | M |
| | 3. neutral | R | I | I | I | M |
| | 4. live with | R | I | I | I | M |
| | 5. dislike | R | R | R | R | Q |

Customer requirement is ...

**A:** Attractive
**M:** Must-be
**R:** Reverse

**O:** One-dimensional
**Q:** Questionable
**I:** Indifferent

Fig. 6: Kano evaluation table

If the customer answers, for example, "I like it that way," as regards "If the edges of your skis grip well on hard snow, how do you feel?" - the functional form of the question, and answers "I am neutral," or "I can live with it that way," as regards "If the edges of your skis don't grip well on hard snow, how do you feel?" - the dysfunctional form of the question, the combination of the questions in the evaluation table produces category A, indicating that edge grip is an attractive customer

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requirement from the customer's viewpoint. If combining the answers yields category I, this means that the customer is indifferent to this product feature. He does not care whether it is present or not. He is, however, not willing to spend more on this feature. Category Q stands for questionable result. Normally, the answers do not fall into this category. Questionable scores signify that the question was phrased incorrectly, or that the person interviewed misunderstood the question or crossed out a wrong answer by mistake. In the study quoted here, no product criterion received a Q-rate higher than 2%. If looking up the answer in the evaluation table yields category R, this product feature is not only not wanted by the customer but he even expects the reverse. For instance, when offering holiday tours it might well be that a specific customer segment wants pre-planned events every day, while another would dislike it (see Berger et. al 1993).

In addition to the Kano questionnaire, it might be helpful to have the customer rank the individual product criteria of the current product and to determine the relative importance of the individual product criteria (self-stated-importance). This will help you establish your priorities for product development and make improvements wherever necessary.

| | If your skis make it much easier for you to ski in deep powder snow, how do you feel? | |
|---|---|---|
| | **☒** I like it that way | |
| | ☐ It must be that way | |
| | ☐ I am neutral | |
| | ☐ I can live with it that way | |
| | ☐ I dislike it that way | |

If your skis make it much easier for you to ski in deep powder snow, how do you feel?
- ☒ I like it that way
- ☐ It must be that way
- ☐ I am neutral
- ☐ I can live with it that way
- ☐ I dislike it that way

If your skis do not make it any easier for you to ski in deep powder snow, how do you feel?
- ☐ I like it that way
- ☐ It must be that way
- ☒ I am neutral
- ☐ I can live with it that way
- ☐ I dislike it that way

How would you rank the deep powder snow features of your skis?

| ☐ | ☒ | ☐ | ☐ | ☐ | ☐ | ☐ |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| totally unsatisfactory | | | | | | excellent |

How important are the following features?

| | totally unimportant | | | | | | very important |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Good edge grip on hard snow | | | | | | | ✘ |
| Ease of turn | | | | | ✘ | | |
| Excellent deep snow features | | | | | | | ✘ |
| Scratch resistant surface | | | ✘ | | | | |
| ...... | | | | | | | |
| | | | | | | | |

Fig. 7: Structure of the Kano questionnaire

## Step 3: Administering the customer interviews

Decide which method you want to use for carrying out the customer interviews. In principle, the most favourable method for ascertaining customer expectations and satisfaction is by mail. The advantages are the relatively low costs and the high level of objectivity of the results; one disadvantage is, however, the frequently low return rate (see also Homburg/Rudolph, 1995). Our experience has shown that standardized, oral interviews are the most suitable method for Kano surveys. A standardized questionnaire reduces the influence through the interviewer, the return rate is very high and in case of comprehension dificulties, the interviewer can explain. Usually the questionnaire must be explained due to its new and unfamiliar nature.

## Step four: Evaluation and interpretation

The questionnaire is evaluated in three steps. After having combined the answers to the functional and dysfunctional question in the evaluation table (see fig. 6), the results of the individual product criteria are listed in the table of results which shows the overall distribution of the requirement categories. The next step is to analyse and interpret the results.
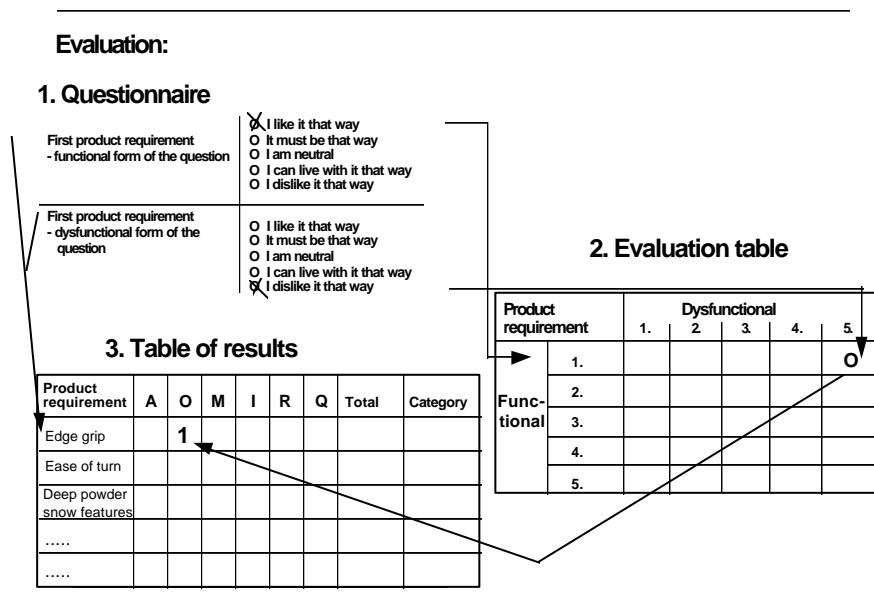


Fig. 9: Evaluation process

The following possibilities are available for processing the results of a Kano survey:

*Evaluation according to frequencies*

An overview of the requirement categories of the individual product requirements is gained from the table of results.

| Product requirement | A | O | M | I | R | Q | Total | Category |
|---|---|---|---|---|---|---|---|---|
| Edge grip | 7 | 32.3 | **49.3** | 9.5 | 0.3 | 1.5 | 100% | M |
| Ease of turn | 10.4 | **45.1** | 30.5 | 11.5 | 1.2 | 1.2 | 100% | O |
| Service | **63.8** | 21.6 | 2.9. | 8.5 | 0.7 | 2.5 | 100% | A |

Fig. 10: Table of results

The easiest method is evaluation and interpretation according to the frequency of answers. Thus, edge grip would be a must-be requirement (49.3%), ease of turn a one-dimensional requirement (45.1%) and service of edges and base an attractive requirement (63.8%).

As a rule, a more differentiated interpretation is required, as the answers to a product requirement are often spread out over more than one category. In this case we believe that this distribution can be explained by the fact that customers in different segments have different product expectations. For instance, we found that the significance of edge grip varies depending on the skill of the skier. While expert skiers presuppose edge grip as a must-be requirement, novices see it as a one-dimensional requirement.

If the questionnaire includes sufficient customer-oriented variables, the results can be used as the ideal basis for market segmentation and thus differentiation of products and services according to utility expectations of the different customer segments.

*Evaluation rule M>O>A>I*

If the individual product requirements cannot be unambiguously assigned to the various categories, the evaluation rule "M>O>A>I" is very useful. When making decisions about product developments, primarily those features have to be taken into consideration which have the greatest influence on the perceived product quality. First those requirements have to be fulfilled which cause dissatisfaction if not met. When deciding which attractive requirements should be satisfied, the decisive factor is how important they are for the customer. This can be determined by using "self-stated-importance" in the questionnaire. If those two or three attractive requirements are fulfilled which are regarded as the most important ones per customer segment, the result is a package of product features which cannot be beaten.

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*Customer satisfaction coefficient (CS coefficient)*

The customer satisfaction coefficient states whether satisfaction can be increased by meeting a product requirement, or whether fulfilling this product requirement merely prevents the customer from being dissatisfied (Berger et al., 1993). Different market segments usually have different needs and expectations so sometimes it is not clear whether a certain product feature can be assigned to the various categories, it is especially important to know the average impact of a product requirement on the satisfaction of all the customers. The CS-coefficient is indicative of how strongly a product feature may influence satisfaction or, in case of its "non-fulfillment" customer dissatisfaction. To calculate the average impact on satisfaction it is necessary to add the attractive and one-dimensional columns and divide by the total number of attractive, one-dimensional, must-be and indifferent responses. For the calculation of the average impact on dissatisfaction you should add the must-be and one-dimensional columns and divide by the same normalizing factor (see Berger et. al., 1993).

Extent of satisfaction:

$$\frac{A+O}{A+O+M+I}$$

Extent of dissatisfaction:

$$\frac{O+M}{(A+O+M+I) \times (-1)}$$

A minus sign is put in front of the CS-coefficient of customer dissatisfaction in order to emphasize its negative influence on customer satisfaction if this product quality is not fulfilled. The positive CS-coefficient ranges from 0 to 1; the closer the value is to 1, the higher the influence on customer satisfaction. A positive CS-coefficient which approaches 0 signifies that there is very little influence. At the same time, however, one must also take the negative CS-coefficient into consideration. If it approaches -1, the influence on customer dissatisfaction is especially strong if the analysed product feature is not fulfilled. A value of about 0 signifies that this feature does not cause dissatisfaction if it is not met.

| Product requirement | A | O | M | I | Total | Category | $\dfrac{A+O}{A+O+M+I}$ | $\dfrac{O+M}{A+O+M+I}$ |
|---|---|---|---|---|---|---|---|---|
| Edge grip | 7 | 33 | **50** | 10 | 100% | M | 0.40 | -0.83 |
| Ease of turn | 11 | **46** | 31 | 12 | 100% | O | 0.57 | -0.78 |
| Service | **66** | 22 | 3 | 9 | 100% | A | 0.89 | -0.25 |

Fig. 11: CS-coefficient

For instance, a bad edge grip with a negative CS-coefficient of -0.83 leads to more than proportional dissatisfaction; good edge grip with a positive CS-coefficient of 0.40 can only slightly increase satisfaction.
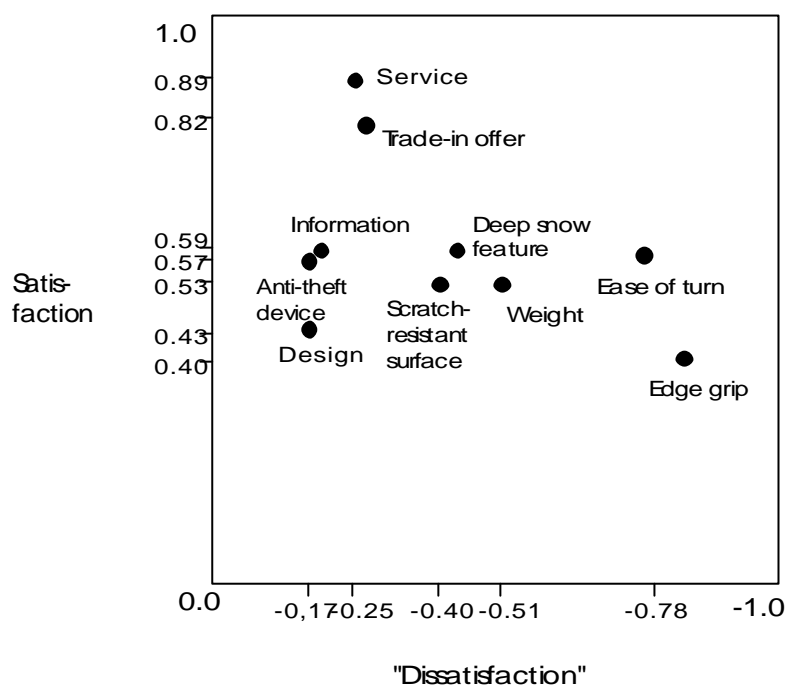


Fig. 12: Influence of product features on satisfaction or dissatisfaction

*Quality improvement index*

The quality of one's own products perceived in comparison to that of the strongest competitors is of prime importance for product development strategies and improvement measures. Thus it is useful not only to have the customers evaluate one's own products but also get customers' opinion of the competitors' products.

The quality improvement index (QI) is the ratio calculated by multiplying the relative significance of a product requirement (self-stated-importance) for the customer with the gap value of the perceived

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product quality (own product versus competitor's product) gained from the rating scale in the questionnaire (see also Griffin/Hauser, 1993):

QI = Relative importance x (evaluation of own product - evaluation of competitor's product)

| How important are the following features? | totally unimportant | | | | | | very important |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Good edge grip on hard snow | | | | | | | |
| Ease of turn | | | | | | | |
| Excellent deep powder snow features | | | | | | | ✘ |
| Scratch-resistant surface | | | | | | | |
| ...... | | | | | | | |

How would you rank the deep powder snow features of your skis?          (own customer)

☐  ✘  ☐  ☐  ☐  ☐  ☐
1   2   3   4   5   6   7
totally
unsatisfactory                              excellent

How would you rank the deep powder snow features of your skis?          (competitor's customer)

☐  ☐  ☐  ☐  ✘  ☐  ☐
1   2   3   4   5   6   7
totally
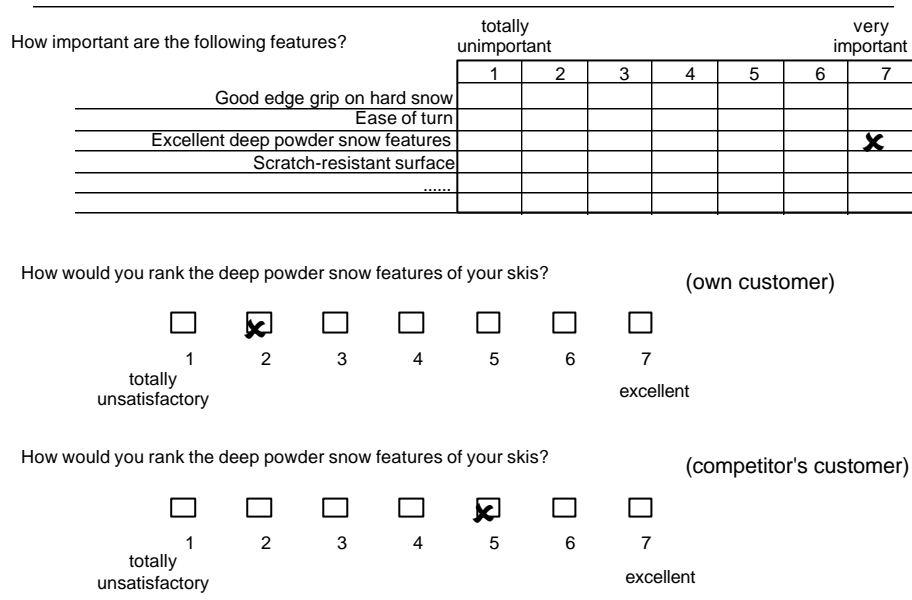unsatisfactory                              excellent

Fig. 13: Quality improvement index

The extreme values of the quality improvement index depend on the number of points in the rating scale. In this example it ranges from -42 to +42. The value is indicative of how important the product requirement is in terms of competition. The higher the value in the positive range, the higher the relative competitive advantage in the perceived product quality from the customer's viewpoint. However, the higher the negative value of this index, the higher the relative competitive disadantage. Therefore it is far more important to improve this product requirement. The own product has a QI of -21 in this example. It goes without saying that action must be taken.

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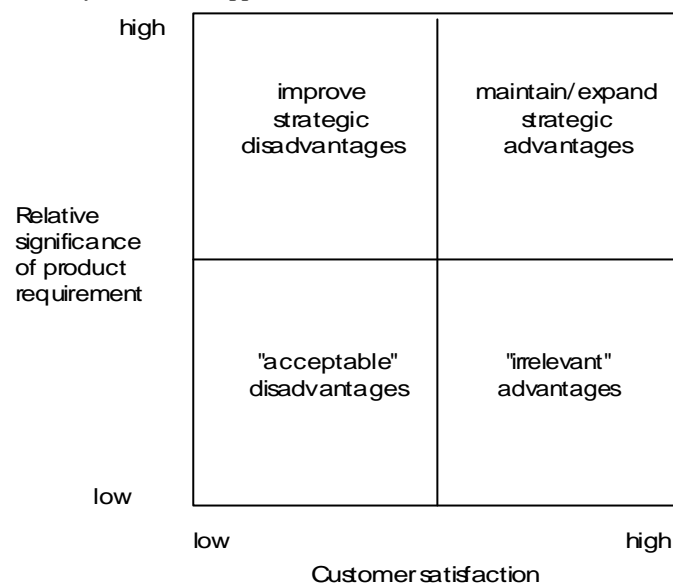| | | |
|---|---|---|
| **high** | improve strategic disadvantages | maintain/expand strategic advantages |
| Relative significance of product requirement | "acceptable" disadvantages | "irrelevant" advantages |
| **low** | low | high |
| | Customer satisfaction | |

Fig. 14: Satisfaction portfolio (Homburg/Rudolph, 1995)

Conclusion:

If one knows to what extent a product feature influences the perceived product quality and in turn influences customer satisfaction (must-be, one-dimensional or attractive requirement), and if one is aware of the relative significance of this product feature and assessment from the customer's viewpoint compared to the competitors, the satisfaction portfolio can be drawn up and suitable measures taken. Of utmost priority are those product requirements which the customer regards as important and which show disadvantages with respect to competitors' products. The long-term objective is to improve customer satisfaction with regard to important product features in order to establish tenable competitive advantages.

The following strategic implications emerge: Fulfill all must-be requirements, be competitive with regard to one-dimensional requirements and stand out from the rest as regards attractive requirements!

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