The factor structure of customer satisfaction

An empirical test of the importance grid and the penalty-reward-contrast analysis

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Abstract *There is growing evidence that service quality attributes fall into three categories of factors that have a different impact on the formation of customer satisfaction. However, it is not clear which analytical procedure best identifies these factors. Vavra proposed a two-dimensional importance grid based on customers' self-stated importance and derived importance using regression analysis. It is based on the assumption that there is a difference between self-stated and derived importance and that by combining these importance weights, three groups of product or service attributes can be identified. Using data collected to measure customer satisfaction with the service of the IT department of a hospital, the authors test the underlying assumptions of the importance grid. They seem to be correct. When the results are compared with the penalty-reward contrast analysis developed by Brandt, the two methods do not yield the same results. Therefore, the convergent validity of the importance grid has to be questioned. The paper closes with a discussion of the implications for research and practice.*

Introduction

The identification of the determinants of customer satisfaction is a central concern for service management academics and practitioners. It is an essential prerequisite for the management of service quality. For service providers, it is crucial to know which service attributes add value and increase satisfaction, which of them merely fulfil minimum requirements and minimize dissatisfaction and which do both. Only then can they make better decisions about how resources should be allocated to different service attributes in order to improve quality and satisfaction. The identification of customer satisfaction factors is crucial. Several methods have been proposed.

Among these methods is a 2D grid proposed by Vavra (1997). It assumes that self-stated and derived importance differ and that by combining these importance weights, three groups of product or service attributes can be identified. This method will be tested empirically. The objective of this paper is twofold. First, the literature on the factor structure of customer satisfaction is reviewed, conclusions are drawn and the strengths and weaknesses of the empirical studies are discussed. Then, the underlying assumptions of the

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importance grid and its validity are tested using the results of an empirical study about customer satisfaction with a hospital's IT department.

Factor structure of customer satisfaction

Research on the determinants of customer satisfaction has been going on for decades. While some early studies in the 1970s were successful in testing a two-factor-theory of customer satisfaction (Swan and Combs, 1976; Maddox, 1981), further studies failed (Leavitt, 1977). These mixed findings resulted in a loss of interest in this topic. With the increasing use of the critical incident technique in service quality research, some scholars began to reconsider the factor structure of customer satisfaction (Stauss, 1999). Several empirical studies have been conducted. Table I gives an overview of the most important studies.

The following conclusions can be drawn:

- Some early studies (Swan and Combs, 1976; Maddox, 1981; Cadotte and Turgeon, 1988; Silvestro and Johnston, 1990; Johnston and Silvestro, 1990) found only two factors: satisfiers and dissatisfiers. This was in line with Herzberg *et al.*'s (1959) categorization of the factors affecting job satisfaction. When Maddox (1981) found attributes related to satisfaction as well as to dissatisfaction, he concluded that this only partially supported the two-factor theory. Later studies, however, were based on a three-factor theory, assuming that the third factor leads to dissatisfaction as well as to satisfaction. Empirical evidence was found in several studies (Brandt, 1987; Brandt and Reffet, 1989; Bitner *et al.*, 1990; Stauss and Hentschel, 1992; Johnston, 1995; Anderson and Mittal, 2000).
- The three-factor structure of customer satisfaction is supported by different research methods. These include the critical incident technique (CIT) (e.g. Johnston, 1995; Stauss and Hentschel; 1992, Bitner *et al.*, 1990; Silvestro and Johnston, 1990; Johnston and Silvestro, 1990; Maddox, 1981 (partly); Swan and Combs, 1976), a content analysis of complaints and compliments (Cadotte and Turgeon, 1988), a rank order of service attributes for good and bad service (Mersha and Adlakha, 1992) and regression analysis (Brandt, 1988; Anderson and Mittal, 2000). It would therefore seem that the theory can be confirmed with respect to the use of different methods and with different services.
- It must be acknowledged that in a great number of the studies, CIT was used to investigate the determinants of customer satisfaction. It is argued that the determinants associated with dissatisfaction are significantly different from those that create satisfaction. Critical incidents mentioned by the customer and largely related to negative experiences (i.e. dissatisfaction) can be classified as basic factors if they are not related to positive outcomes. Critical incidents that are mentioned as positive as well as negative are thought to indicate performance factors, and critical incidents that are related to positive

Table I.
Empirical studies on the factor structure of customer satisfaction

Author(s)	Hypotheses	Method	Results
Swan and Combs (1976)	Two factors: instrumental attributes (performance of the physical product) as dissatisfiers and expressive attributes (psychological performance of the product) as satisfiers	Critical incident technique	Hypotheses confirmed
Leavitt (1977)	Two factors: intrinsic factors (product attributes) as motivators, extrinsic factors (price, distribution, promotion) as hygiene factors	Factor analysis	Two-factor theory not supported; however, classification into intrinsic and extrinsic factors according to the variables of the marketing mix questionable
Maddox (1981)	Replication of the findings of Swan/Combs (1976): Two factors: instrumental attributes (performance of the physical product) as dissatisfiers and expressive attributes (psychological performance of the product) as satisfiers	Critical incident technique	Two-factor theory partially supported, depending on how ambivalent critical incidents are classified
Brandt (1988, 1987) and Brandt/Reffet (1989)	Three factors: penalty-factors (minimum requirements), reward-factors (value enhancing features), and hybrid factors with impact on satisfaction as well as on dissatisfaction	Regression analysis with dummy variables	Three-factor theory supported
Cadotte and Turgeon (1988)	Two factors: complaints as dissatisfiers and compliments as satisfiers	Analysis of the content of complaints and compliments	Two-factor theory supported. In addition, some variables elicit both satisfaction and dissatisfaction
Silvestro and Johnston (1990), Johnston and Silvestro (1990)	Two factors: hygiene-factors and motivators	Critical incident technique	Two-factor theory supported. In addition to the two factors, a third factor which leads to satisfaction as well as to dissatisfaction was identified

(continued)

Table I.

Author(s)	Hypotheses	Method	Results
Bitner *et al.* (1990)	Three-factor theory not explicitly tested. If, however, critical incidents are classified as satisfying or dissatisfying, three factors can be derived	Critical incident technique	Critical incidents associated with the three factors
Stauss and Hentschel (1992)	Three-factor theory not explicitly tested, but results support two-factor theory	Critical incident technique	"Minimum requirements" and "value-enhancing elements" as independent factors identified
Mersha and Adlakha (1992)	Hypothesis: different causes of good and bad service	Rank order of attributes according to perceived importance	Hypothesis supported: causes of good and bad service are different
Johnston (1995)	Replication of Silvestro and Johnston (1990). Three factors: hygiene-factors, dual-threshold-factors, and motivators	Critical incident technique	Three-factor theory supported
Johns and Howard (1998)	Identification of satisfiers and dissatisfiers. Positive and negative comments on attributes differ	Profile accumulation technique (Johns and Lee-Ross, 1996) to identify positive and negative customer comments	Frequencies of positive and negative customer comments on 18 attribute categories differ
Anderson and Mittal (2000)	Non-linear relationship between attribute-satisfaction and overall satisfaction	Regression analysis with dummy variables	Three-factor theory supported
Backhaus and Bauer (2000)	Asymmetric effects of critical incident and non-linear satisfaction formation	Critical incident technique	Distinction between value-enhancing elements and minimum requirements

outcomes (satisfaction) but rarely or never to negative outcomes (dissatisfaction) are considered excitement factors. This reasoning, however, should be questioned. It is not clear whether the customer mentions negative incidents related to a certain service attribute because he/she does not remember positive incidents related to this particular service attribute (in that case it is a basic factor: the incident was perceived as positive but not remembered because it was regarded as normal and hence not critical) or whether good performance in this service never occurred. The same is valid for excitement factors. It is not clear whether the customer does not remember negative incidents (because they did not lead to dissatisfaction and are therefore not critical) or whether there were no negative incidents related to this service attribute. Johnston (1995), for instance, identified "attentiveness/helpfulness" as a satisfier (excitement factor) in the banking industry because customers mainly mentioned it in relation to positive experiences. However, it is not evident whether customers mentioned attentiveness/helpfulness only in relation to satisfactory consumption experiences because they did not regard employees' inattentiveness as critical incidents worth mentioning, or whether employees were simply always helpful and never inattentive. In this case, critical incidents are not reliable indicators for basic, excitement or performance factors.

Despite the criticism of the use of CIT as a method to identify the satisfaction factors, it seems evident that there is a difference between the causes of satisfaction and dissatisfaction. Some leading researchers on customer satisfaction (e.g. Anderson and Mittal, 2000; Oliver, 1997; Gale, 1994), as well as popular authors and practitioners (Deschamps and Nayak, 1995; Dutka, 1993; Shiba *et al.*, 1993) share this view. What emerges is the following three-factor structure of customer satisfaction:

(1) *Basic factors.* These are minimum requirements that cause dissatisfaction if not fulfilled but do not lead to customer satisfaction if fulfilled or exceeded. The fulfilment of basic requirements is a necessary but not sufficient condition for satisfaction. Basic factors are fully expected. The customer regards the basic factors as prerequisites; he/she takes them for granted and therefore does not explicitly demand them.

(2) *Performance factors.* These factors lead to satisfaction if fulfilled or exceeded and lead to dissatisfaction if not fulfilled. Hence, they can cause both satisfaction and dissatisfaction.

(3) *Excitement factors.* These are the factors that increase customer satisfaction if delivered but do not cause dissatisfaction if they are missing.

This reasoning has some significant implications for the management of service quality (Matzler *et al.*, 1996): basic requirements have to be identified

and fulfilled. They establish a market entry "threshold". If they are delivered at a satisfactory level, increasing their quality does not lead to an increase in customer satisfaction. Performance factors are typically customers' articulated needs and desires. Therefore, a service provider should be competitive with regard to performance factors. Excitement factors are unexpected and surprise the customer. They generate "delight", so a service provider should try to stand out from the competition with regard to excitement factors.

Identification of factors using the importance grid

The three-factor theory of customer satisfaction contradicts the traditional view that the relative importance of service attributes is adequately represented as a point estimate. Instead, it has to be seen as a function of satisfaction. Basic factors do not lead to satisfaction if performance is high. In that case, their impact on satisfaction (i.e. their relative importance) is low. If, however, performance on basic factors is lower than expected, they cause high dissatisfaction (i.e. their relative importance is high). The opposite is true of excitement factors. If they are delivered, customers will be delighted. Hence, they have a strong impact on satisfaction. However, when excitement factors are not delivered, they do not lead to dissatisfaction. In other words, when attribute performance changes, so does relative importance.

Vavra (1997, p. 383) argues that the relative importance of service attributes differs depending on whether it is derived explicitly (customers' self-stated importance) or implicitly (based on an attribute's correlation with an external criterion such as overall satisfaction).

If customers are given a list of attributes and asked to rate their importance, basic factors will be considered as the most important. Because basic factors form the core of a product or service, they are minimum requirements that customers will rate as very important. However, they have little or no impact on satisfaction when their performance is high. Compared to basic factors, excitement factors will be rated as less important, but if delivered, they greatly increase satisfaction. Excitement factors are totally or partially unexpected and constitute an "augmented" product or service. Performance factors will be somewhere in between. Consider the example of an airline: if customers are asked how important the attributes "safety" and "no loss of luggage" are, they may rate them as extremely important. Compared with these attributes, which are obviously basic factors, "quality of food" or "attentiveness of flight attendants" are certainly less important.

This contradicts the three-factor theory. If "safety" and "no loss of luggage" are delivered at a satisfactory level, their impact on satisfaction should be low. On the other hand, if flight attendants are perceived as very attentive and the food is good, these attributes will strongly affect customer satisfaction. Hence, their relative importance is high. Put another way, the three-factor theory suggests that customers' self-stated importance does not adequately measure the relative importance of attributes. It does not reflect the satisfaction-importance relationship. When some form of implicit measurement of

importance (based on the attribute's correlation with an external criterion such as overall satisfaction) is used, relative importance is derived *given the current level of attribute satisfaction*. Therefore implicitly derived importance may differ from the relative importance weights derived from customers' self-stated importance.

Vavra (1997, p. 383) proposes that by combining explicitly and implicitly derived attribute importance weights in a two-dimensional importance grid, three satisfaction factors can be identified (Figure 1). The mean or median of the importance weights is used for the horizontal and vertical coordinates of the matrix.

The following factors can be identified:

- Attributes with low implicit and high explicit importance are considered as basic factors (lower right). These are must-be requirements of a product or a service. Customers say these attributes are important but they do not affect overall satisfaction when customers' expectations are met or exceeded.
- Attributes in the upper right quadrant with high implicit and high explicit importance are important performance factors; those in the

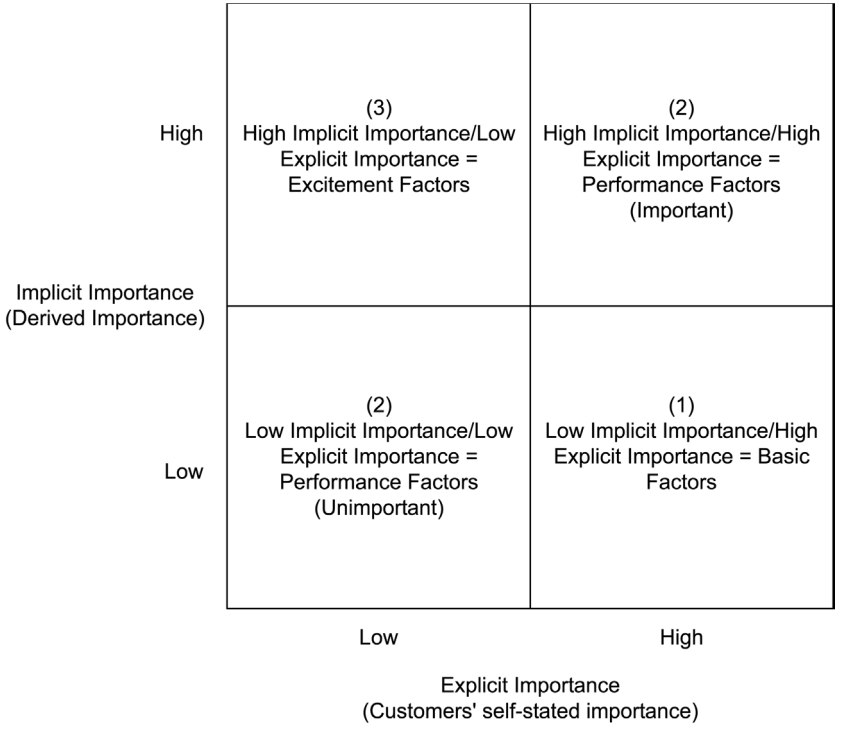


Figure 1.
The importance grid

Source: Adapted from Vavra (1997) p. 385

lower left with low implicit as well as low explicit importance are unimportant performance factors. Satisfaction increases linearly depending on performance.

- Excitement factors are those that have a high implicit but a low explicit importance. Customers say they are not important, but if delivered they enhance customers' satisfaction, but do not cause dissatisfaction if not delivered.

In this paper these assumptions are tested empirically based on the following hypotheses:

H1. Explicitly and implicitly derived attribute importance weights differ.

This is the basic assumption of the importance grid as satisfaction factors are derived by combining these two importance weights.

H2. Customers' self-stated attribute importance (explicitly derived importance) is not a function attribute satisfaction.

Hence, it does not reflect the satisfaction-importance relationship.

H3. Implicitly derived attribute importance is a function of attribute satisfaction and there is a non-linear relationship between attribute-level satisfaction and overall satisfaction

Furthermore, converge importance grid with attribute classification using the penalty reward contrast analysis (PRC) proposed by Brandt (1987). The following hypothesis is tested:

H4. The importance grid and PRC both lead to the same classification of attributes.

Methodology

A total of 171 questionnaires on customer satisfaction with the internal computer services of a hospital IT department were completed and collected. Several focus groups were formed to identify specific service attributes. A multiple regression analysis was conducted and five attributes were found to have a significant impact on customer satisfaction: accessibility, competence, reliability, friendliness, project management. Satisfaction with the single attributes as well as overall satisfaction with the service was measured using a five-point Likert scale (scaling from "very satisfied" to "very dissatisfied"). Attribute importance was measured using a constant sum scale. In their empirical study, Griffin and Hauser (1993, p. 17) considered three different measures of importance (direct rating, constant-sum scale, anchored scale) and found no significant differences between the methods. However, constant sum scales allow a sharper distinction on importance weights if the number of attributes is kept low. The questionnaire was sent to 350 "internal" customers of the IT department and 171 usable questionnaires were returned (return rate 48.6 percent).

Results

H1. *Implicitly and explicitly derived importance weights differ*

Implicitly derived importance was measured using multiple regression analysis. Overall satisfaction was regressed on the five attributes. The standardized regression coefficients are used as measures of attribute importance. The five attributes are significant on a level of $p = 0.05$; the adjusted R^2 is 0.559.

Explicitly derived importance was measured using a constant-sum scale. The percentage of the points assigned to the attributes indicates the importance of each attribute. Results are presented in Table II.

Using a constant-sum scale as a measure for importance weights, competence and accessibility are considered as the most important service attributes, followed by reliability and friendliness. Project management seems to be the least important attribute. However, when importance weights are derived implicitly using standardized regression coefficients, results differ. Competence is ranked third, whereas project management and accessibility have the highest importance weights. Friendliness is the least important service attribute. Spearman's rank order correlation coefficient was calculated between the rankings of explicit and implicit attribute importance. The rank order coefficient is not significant ($p = 0.837$). These results support *H1*. Attribute importance depends on whether explicitly or implicitly derived importance weights are used.

Using Vavra's (1997, p. 385) two-dimensional grid, the following factors can be identified (Figure 2):

- *Basic factors*. Accessibility and competence are basic factors; they are of low implicit but high explicit importance.
- *Performance factors (low importance)*. Friendliness and reliability; both implicit and explicit importance is low.
- *Excitement factor*. Project management. Customers' self-stated importance is low, but implicitly derived importance is high.

It is interesting to note that friendliness and reliability are neither implicitly nor explicitly important. Compared to the basic factors, friendliness is rated as less important using the constant sum scale because it is not a core attribute. Implicitly derived importance is also relatively low. The regression coefficient, which measures importance at the actual level of attribute satisfaction, is 0.133. However, its importance increases when satisfaction is high (see Figure 3). A look at the regression analysis with dummy variables (Figure 3) shows that friendliness is an excitement factor. It is unimportant as long as satisfaction is low but becomes important when satisfaction is high (regression coefficient = 0.159). The regression coefficient in Table II (0.133) measures the importance of friendliness at the current level of performance and its importance is underestimated because an increase in the level of satisfaction with the attribute increases its importance.

Explicitly derived attribute importance (constant-sum scale)			Implicitly derived attribute importance (regression analysis)		
Rank	Attribute	Importance Weight (percentage of points assigned)	Rank	Attribute	Importance weight
1	Competence	28.09	1	Project management	0.437
2	Accessibility	26.98	2	Accessibility	0.223
3	Reliability	19.17	3	Competence	0.194
4	Friendliness	15.18	4	Reliability	0.134
5	Project management	10.59	5	Friendliness	0.133
		100			
	Arithmetic mean	20		Arithmetic mean	0.224

Notes: Adjusted $R^2 = 0.559$; p for all attributes ≤ 0.05

Table II. Explicitly and implicitly derived importance weights

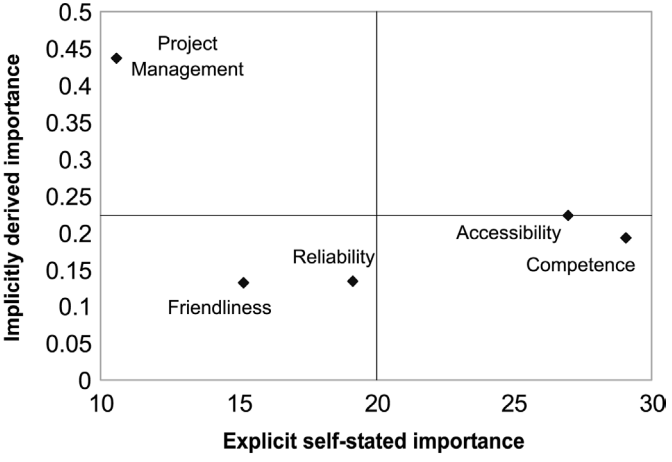
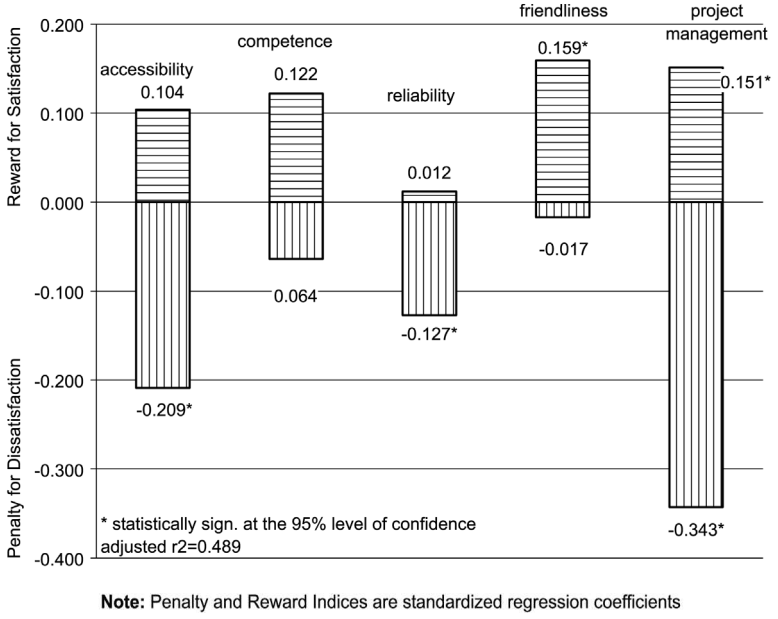


Figure 2.
Importance grid

H2. *Customers' self-stated importance (explicitly derived importance) is not correlated with attribute satisfaction*

The importance-performance relationship was discussed by Sampson and Showalter (1999). Using partial ranking as a means to measure attribute importance, they found an inverse relationship between perceived importance and perceived performance. At first glance, these findings contradict our *H2*. However, Sampson and Showalter (1999, pp. 6, 20) stress that importance and performance must not be considered as independent constructs. Therefore, importance has to be measured at the current level of attribute performance. If



Note: Penalty and Reward Indices are standardized regression coefficients

Figure 3.
Attribute importance depending on satisfaction

the researcher and subject both assume that the measurement is taken at the current level of attribute performance, then different levels of performance elicit different levels of importance. Hence, Sampson and Showalter's findings do not necessarily contradict *H2* if customers rank attribute importance given the current level of attribute performance.

In order to test *H2*, a regression analysis was conducted, with the importance weights as dependent variables and attribute satisfaction as independent variables. The results are reported in Table III.

With the exception of project management, the models are not significant at level $p = 0.05$. However, with an R^2 of 0.047, the influence of satisfaction with project management on its importance can be neglected (regression coefficient = 0.216, $p = 0.045$). Hence, it supports *H2*: explicitly derived importance is not a function of satisfaction.

H3. *Implicitly derived importance is a function of attribute satisfaction and there is a non-linear relationship between attribute-level satisfaction and overall satisfaction*
Some attributes will be important at high satisfaction but unimportant at low satisfaction or if they are missing. The importance of other attributes will decrease when satisfaction increases. In order to test the hypothesis stated above, we applied the penalty reward contrast analysis (PRC) suggested by Brandt (1987). For our purposes, this method has two advantages. First, the attribute importance given the level of attribute satisfaction can be measured. Second, the results allow us to classify service attributes into basic, performance and excitement factors. Hence, the convergent validity can be assessed.

Brandt (1987) proposes a type of regression analysis that uses dummy-variables to identify minimum requirements (basic factors) and value-enhancing requirements (excitement factors). In essence, one set of dummy variables is created and used to quantify excitement factors and another set is created to quantify basic factors[1]. Basic factors and excitement factors are expressed in scale units of the dependent variable (overall satisfaction). In order to conduct the analysis in this study, attribute satisfaction ratings were recoded. "Very satisfied" ratings were used to form the dummy variables to quantify excitement factors (value of "0"), while "somewhat dissatisfied" and "very unsatisfied" ratings were used to form the dummy variables expressing basic factors (value of "1"). "Somewhat satisfied" and "neither satisfied nor unsatisfied" were defined as expressing indifference (expectations were met). Indifferent customers comprise a

Independent variable	R	R^2	F	Significance
Accessibility	0.069	0.005	0.670	0.414
Competence	0.062	0.004	0.541	0.463
Reliability	0.039	0.002	0.200	0.655
Friendliness	0.164	0.027	3.551	0.062
Project management	0.216	0.047	4.418	0.045

Table III.
Relationship between satisfaction and explicitly derived importance

reference group. Based on this recoding, a multiple regression analysis is conducted to quantify the basic and excitement factors using the five-point overall satisfaction ratings as dependent variable and dummy variables for rewards and penalties as independent variables. The constant in the regression equation is the average of all the reference groups on overall satisfaction. "Penalties" are expressed as an incremental decrease (i.e. amount subtracted from the constant) associated with low satisfaction, while "rewards" are expressed as an incremental increase (i.e. amount added to the constant) associated with high satisfaction on a certain attribute. If the penalty exceeds the reward the attribute in question is a basic factor. If the reward outweighs the penalty, the attribute is considered as an excitement factor. If reward and penalty are equal the attribute leads to satisfaction when performance is high as well as to dissatisfaction when performance is low. Hence, it is a performance factor "hybrid" (Brandt, 1987, p. 63).

Results of the analysis, as shown in Figure 3 suggest that attribute importance indeed differs depending on satisfaction. Penalties for low satisfaction outweigh the rewards for high satisfaction with respect to accessibility and reliability. The reward for accessibility is 0.104, but it is not statistically significant at the 0.05 level. These attributes would be considered as basic factors. Rewards for high attribute satisfaction are low; penalties for low satisfaction are high. Friendliness can be considered as an excitement factor. Doing well on this attribute adds value for the customer and results in increased overall satisfaction. Project management can be classified as a performance factor. The penalty for not performing on a satisfactory level is considerable, being twice as great as the reward. Additionally, the reward is high and statistically significant. Neither penalties nor rewards are statistically significant for competence; therefore, it cannot be classified.

In summary, *H3* is supported. Importance weights differ depending on the level of satisfaction.

H4. *The importance grid and penalty-reward contrast analysis (PRC) both lead to the same classification of attributes*

In order to test the convergent validity of the importance grid, its classification was compared with the classification using PRC. The results are shown in Table IV.

The classification results differ strongly from each other. Only accessibility is classified as the same factor using both methods. The differences are

Table IV.
Comparison of the classification results of the importance grid and the PRC analysis

Attribute	Classification according to the importance grid	Classification according to PRC
Accessibility	Basic factor	Basic factor
Competence	Basic factor	Not significant
Reliability	Performance factor	Basic factor
Friendliness	Performance factor	Excitement factor
Project management	Excitement factor	Performance factor

enormous: friendliness is classified as a performance factor with low importance in the importance grid but as an excitement factor in the PRC analysis. Project management is classified as excitement factor in the grid and as performance factor in the PRC analysis. *H4* must be rejected. In this study we could not find convergent validity. These results are surprising as the hypotheses underlying the importance grid are supported. There may be a number of reasons for this and they will be discussed in the next section.

Implications for research

H1, *H2* and *H3* are supported. Hence, the underlying assumptions of the importance grid seem to be valid. *H4*, however, could not be supported. Using Vavra's (1997, p. 385) 2D importance grid, different satisfaction factors were identified. However, when the attribute classification is compared with PRC analysis, no convergent validity was found. These are surprising results for which there may be several reasons.

First, although the assumptions seem reasonable, there is no underlying theory that explains why the different satisfaction factors can be derived by combining implicitly and explicitly derived importance weights. Clearly, this lack of theory should be addressed in future research before further empirical tests are conducted.

Second, direct measurers of attribute importance tend to be ambiguous and unreliable (e.g. Oliver, 1997). This fact can be attributed to a number of factors.

There is some empirical evidence that attribute importance changes in different phases of the purchase and consumption process. Gardial *et al.* (1994), for instance, found significant differences of attribute importance in the pre-purchase phase and post-purchase evaluation using inductive retrospective verbalizations of consumers to recall their pre- and post-purchase product experience. Whereas determinant attributes in the pre-purchase phase were more specific and goal directed, post-purchase evaluations of attributes tended to be at an aggregate level and differed significantly from the attributes mentioned in the pre-purchase phase. Therefore, if the researcher and the consumer do not relate importance weights to the same situation, they are ambiguous and difficult to interpret.

Consumers can interpret importance in different ways. The importance grid is based on the assumption that explicitly derived importance is interpreted as meaning essential. In that case, core attributes such as "no loss of luggage" of an airline, brakes of a car, etc. are considered as very important. However, if consumers interpret importance as meaning desirable, basic factors become unimportant and performance and excitement factors become decisive. Hence, if it is not clear whether importance is interpreted as essential by the customer, then explicitly derived importance weights are ambiguous and their use in the importance grid is questionable.

Attribute importance is a function of performance. Basic factors, for instance, are important if not present or delivered at a satisfactory level. Consumers, however, can rate the importance of an attribute for its absence or presence (Oliver, 1997, p. 55). Therefore, the importance weights will change

depending on the situation to which the importance weights refer. As a consequence, explicitly derived importance weights are extremely difficult to interpret if it is not clear whether consumers rated them for their presence/absence or for their high/low quality.

Explicitly derived importance weights may result from socially acceptable or "politically correct" answers (Oliver, 1997, p. 59) or from strategic considerations. The environmental compatibility of a product, for instance, may be rated high in importance, but in many cases it does not play a major role in the purchase decision. Price may be rated as extremely important and low in satisfaction if customers expect a price reduction as a result of the satisfaction survey.

As a consequence, the use of explicitly derived importance weights is a potential source of misinterpretations if it is not clear how consumers interpret and assign importance weights.

Third, attribute classification using means for the coordinates of the matrix is somewhat arbitrary. The classification of attributes depends on the number and the relative importance of attributes included in the survey. For example, if two or three very unimportant attributes were included, the mean of importance weight would be much lower; thus accessibility and competence could possibly be classified as performance factors. Therefore, future studies should test different, less arbitrary criteria for the coordinates of the matrix.

Fourth, other measures of self-stated importance should be tested. Griffin and Hauser (1993) found no significant differences between direct rating, constant-sum scales and anchored scales in their study. However, each method has some specific advantages and disadvantages. The constant-sum method typically results in a sharper distinction of attribute importance. On the other hand, the greater the number of attributes included, the more difficult it becomes to assign a given sum of points. This in turn could lead to a lower ability to discriminate. Rating scales often suffer from the inability to discriminate and most attributes are rated as highly important. Therefore, alternative methods for the assessment of self-stated importance should be tested.

Finally, a possible limitation of this study could pertain to the sample. In this study, no convergent validity was found. However, the sample reflects only one firm in one industry. The subjects of this study were internal customers of a hospital's IT department. There might be a satisfaction bias as this is a monopolistic context and customers cannot choose between different service providers. Therefore, additional studies are clearly needed. They should be based on other samples using other services in order to cross-validate the findings.

To conclude, as the theoretical considerations in this section and the results of this study suggest, it is questionable whether the importance grid produces valid results. PRC, on the other hand, has been used successfully to identify satisfaction factors in a variety of settings (e.g. Anderson and Mittal, 2000; Brandt, 1987). PRC has another important advantage: while the importance grid, if at all, can only identify the satisfaction factors, PRC measures the asymmetric relationship between attribute-level satisfaction and overall

satisfaction using regression coefficients for low and high performance. As a consequence, its diagnostic value is much higher. However, PRC is usually able to explain only a relatively small amount of variance (48.9 percent in this study), which is attributed to the loss of information due to the use of dichotomized independent variables (see Wittink and Bayer, 1994). Therefore, the lower R^2 does not constitute a serious problem; it simply seems to be an artifact of the measurement system.

To the best of our knowledge, artificial neural networks (ANN) have not yet been used to find the factor structure of customer satisfaction. As West *et al.* (1997) have shown, ANN offer significant advantages over traditional estimation procedures for assessing consumers' attitudes, preferences, judgment and choice behavior. ANN are considered a valuable tool when decision rules are nonlinear and non-compensatory. ANN therefore seem to be a very promising approach to identifying satisfaction factors and should be addressed in future research.

Finally, from a theoretical point of view, it is interesting to note that the three-factor theory of customer satisfaction is not in line with prospect theory (Kahneman and Tversky, 1979), which states that "losses loom larger than gains" (Einhorn and Hogarth, 1981). In the context of customer satisfaction, this means that negative performance of an attribute has a greater impact on overall satisfaction than positive performance of this attribute. This, however, as has been shown in this study and in other studies cited in this paper's literature review, is only true of basic factors. Excitement factors are important to the customer when performance is high. Hence, it seems that in the context of customer satisfaction, prospect theory needs to be extended. There are obviously product or service attributes that have a greater impact on overall satisfaction when satisfaction is high than when satisfaction is low.

Implications for practice

One important finding of this study is the sensitivity of importance weights to the method (explicitly versus implicitly derived importance). This is attributed to the fact that when using some form of self-stated importance, customers may not take into account the current level of attribute satisfaction, whereas a regression analysis elicits importance weights at the current level of performance. Hence, the importance-satisfaction relationship is not reflected in the measurement. As Sampson and Showalter (1999) put it, this has significant implications for survey design in the area of customer satisfaction. Managers should be very cautious when using direct importance measures and make sure that researcher and customer interpret importance weights the same way. Furthermore, when some form of self-stated importance is used, customers should be asked to rate it given the current level of attribute satisfaction.

This also means that the original importance-performance analysis introduced by Martilla and James (1977) has to be reconsidered because importance and performance seem to be correlated. Managers need to be aware that a change of attribute satisfaction can cause a change of attribute

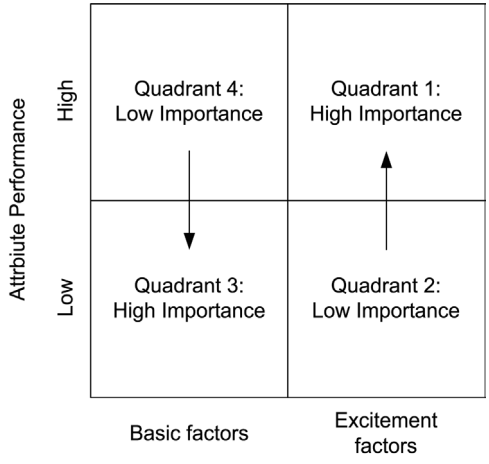


Figure 4.
Attribute classification and importance

importance. It is therefore crucial to estimate the relative impact of each attribute for high and low performance.

If the non-linearities are not considered, the impact of the single attributes on overall satisfaction is not being correctly assessed. Figure 4 shows how the importance of basic and excitement factors changes when satisfaction with the attribute changes.

The importance of basic factors is underestimated if performance is high and overestimated if performance is low (see also Anderson and Mittal, 2000). If the performance of excitement factors is low, their impact is likely to be underestimated. Managers would not make an effort to enhance performance and would, as a consequence, ignore opportunities for improvement.

Note

1. For a detailed description see Brandt (1987, pp. 62-3).

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