END-USER SATISFACTION MEASUREMENT IN FACILITY MAINTENANCE SERVICES

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ABSTRACT

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Abstract

The phenomenon of customer satisfaction has received a lot of attention over the past two decades, both from academic as well as from the practitioner's side. Goods-related quality know-how, e.g. Total Quality Management is not directly applicable in service organisations. This paper extents the knowledge on satisfaction measurements in the field of facility maintenance services and their specific circumstances.

The goal of this work is to propose a measurement model for end-user satisfaction in facility maintenance services, while taking into account the different theories on customer satisfaction and the specific circumstances of end-user perception in facility maintenance services. The study is made both as literature review and empirical interviews and discussions with people involved in the procurement and provision of facility maintenance services.

End-user satisfaction is a part of total customer satisfaction which can be seen as the overall assessment of the service provider's performance influencing the customer's repurchasing intention. Most of the end-users are typically not in charge of purchasing of maintenance services and they do not pay attention towards them at all. Typically only quality faults wake attention of average end-users.

The study presents and combines different understandings of customer satisfaction, perceived technical and functional service quality model, Servqual tool and the zone of tolerance model. Different customer satisfaction scales are also presented and weighted.

The study suggests measures for technical and functional quality of facility maintenance services. Special attention is paid to timing and frequencies of satisfaction measurements. Immediate feedback collection can be seen really important tool to get online valid and reliable feedback of the current end-user satisfaction towards non-core maintenance services.

As a conclusion satisfaction measurement alone does not lead anywhere. It always has to be integrated into a customer oriented strategy from which the objectives to be measured can be derived.

Keywords:
Facility maintenance services, satisfaction measurement, quality measurement, performance measurement

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Preface

This research supported the development of a dynamic earning system for facility maintenance services in the Finnish facility services market. It is therefore part of the Liike!-Project (Goal-oriented Business Relations in Facility Service Markets) carried out in the Construction, Economics and Management Laboratory of Helsinki University of Technology. In particular it supported the second part of this project which concentrated on the development of a rewarding system, while the first part identified different buyer-seller relationships and their characteristics and the third part concentrates on service contracts in partnering relations.

Main financier of the Liike!-project was Tekes. 11 companies financed and participated to the project. Management group was formed of representatives of all participating parties. We want to thank all financiers and management group members of supporting and steering the project.

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1 Introduction

1.1 Research background

In today's global markets organisations try more and more to gain a competitive advantage through a deeper and better knowledge of their customers and their needs. Customer orientation of the entire organisation promises added value and in the long run the justification of the pure existence of a company. Customer orientation distinguishes the winners from the losers.

Organisations spend millions each year identifying customer needs and to measure how well they meet them. All aim to reach a high level of customer satisfaction as this is one important antecedent of customer retention. To keep an existing customer is known to cost only 1/5 of the sum which is needed to gain a new customer.¹

Consequently the phenomenon of customer satisfaction has received a lot of attention over the past two decades, both from academic² as well as from the practitioner's side. It is also a cornerstone of the Total Quality Management (TQM) concept.³ However, this quality movement (TQM) is overwhelmingly devoted to issues related to goods quality. Because of the characteristics of services, much of the goods-related quality know-how is not directly applicable in service organisations.⁴

Therefore service specific approaches have to be developed. This is the intention of this thesis; it extents the knowledge on satisfaction measurements in the field of facility maintenance services and their specific circumstances. Additionally this work pays special regard to the addressees of facility maintenance services as their input is crucial for a functional and valid evaluation.

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² Brown, Fisk and Bitner identified publication of 20 books and more than 150 academic papers on service marketing for the years 1990 to 1992 alone (excluding those which where published in specialized niches of service marketing).
1.2 Research goals

As one part of the dynamic earning model is based on the satisfaction of the client with the procured facility maintenance services, the task of this work is to identify how the employees of the client company, as the ultimate beneficiaries of these services, perceive these maintenance services. Hence the goal of this work is to propose a measurement model for end-user satisfaction in facility maintenance services, while taking into account the different theories on customer satisfaction and the specific circumstances of end-user perception in facility maintenance services.

Therefore this work is guided by the following research questions:

- What is customer satisfaction like?
  - Why is it important?
  - How to measure customer satisfaction?
- What is end-user satisfaction in facility maintenance services like?
  - Which are characteristics of facility maintenance services?
- Which are suitable tools for measuring end-user satisfaction in facility maintenance service?
- Which are possible key performance indicators of customer satisfaction in facility maintenance services?

Thus chapter two of this thesis concentrates on answering the first three questions, it deals with the understandings and theories of customer satisfaction, while chapter three investigates the question what end-users satisfaction in facility maintenance services is like. In chapter four the last two research questions are solved. The results of the above mentioned model for measuring end-user satisfaction in facility maintenance services and the proposition of a key performance indicator for facility maintenance services are presented.
1.3 Research methods

The present study draws its conclusions from the use of two different research methods. On the one hand from a literature review and on the other hand from interviews and discussions with people involved in the procurement and provision of facility maintenance services.

Therefore this paper investigates the theoretical framework of customer satisfaction through a literature review. This literature review is mainly based on articles accessed through different electronic databases (Emerald, ProQuest, Elsevier, JSTOR, EBSCO and SpringerLink), but also draws on other works by the most influential authors in this particular field. The articles cited in this work have been published in the following journals:

- International Journal of Service Industry Management
- Journal of Business & Industrial Marketing
- Journal of Business Research
- Journal of Marketing
- Journal of Marketing Research
- Journal of Retailing
- Journal of Service Marketing
- Journal of the Academy of Marketing Science
- Managing Service Quality
- Quirk’s Marketing Research Review
- The Journal of Consumer Research
- The TQM Magazine

The theories, models and measurement tools identified were scrutinized and if applicable adapted to the field of facility maintenance services. A great variety of understandings and opinions concerning customer satisfaction could be discovered during the research. Some theories were found contradicting each other, while others support each other.

The measurement model proposed in this work combines the theories and measurement tools proposed in the literature with the demands of the special setting of facility maintenance services. These special circumstances of facility maintenance services and those of end-users of these services were explored by focus group interviews with facility service personnel – both on the buyer as well as
on the service provider’s side. Due to the complexity of the topic the interviews were conducted in an open, unstructured way in order to avoid preconceptions of the interviewees. Because of the open approach the information was gathered in multiple encounters with people involved in either the purchasing or the provision of facility maintenance services. Nevertheless five interviews, three with buyer personnel and two with service provider personnel provided most information. All persons who were interviewed are employed by project partners.

The Validity of the proposed model was achieved by a thorough literature review and discussions of the findings. Hence through the discussions within the Liike! research team and the scrutinising of ideas developed the plausibility and logical integrity was assured.

As in most mainly theoretical works the issue of reliability is addressed primarily through the presentation of all relevant ideas and by deriving from those ideas the principles applicable in this case. Thus through the reference of all cited work it is possible for other researchers to follow the path taken as well as to trace backwards the conclusions reached in this work.

### 1.4 Research focus

Facility maintenance services are those services which are needed to retain an existing infrastructure. In this case the infrastructures in focus are office buildings. Consequently the appropriate upkeep of these, to in the end insure the wellbeing and productivity of the workforce within, are at the heart of facility maintenance services. To achieve this aim facility maintenance services have to deal with a wide array of tasks and requirements. To match these requirements facility maintenance services are divided into different service areas. Among these the most important ones are:

- Heating, ventilation and air conditioning (HVAC)
- Cleaning and waste management
- Janitorial services, including
  - Plumbing and
• Electricity
  • Services for the outside areas (e.g. gardening, winter services)

This paper focuses therefore on how these services are perceived by the end-users who are using the office buildings. To measure their satisfaction with these services is the task at hand.

At the same time this is also one limitation of this work. Customer satisfaction measurement alone does not lead anywhere. It always has to be integrated into a customer oriented strategy from which the objectives to be measured can be derived. Often this strategy is called customer relationship management and contains beside the actual measurement of customer satisfaction also other elements. These include e.g. the management of the information channel towards customers, the management of expectations, the analysis of all kinds of customer feedback data and the responsibility for process improvement.

Thus this work does not try to explain or improve a current end-user – service provider relationship, but concentrates on identifying what customer satisfaction in facility maintenance services context means and what specific requirements shape the measurement process for end-users.

Therefore the input from the practical side has great influence on the development of the measurement model. After all a reliable and valid measurement model for the specific circumstances of maintenance services was the objective. Additionally the proposed model has to be usable and widely applicable. One explicit requirement on behalf of the industry was a high level of end-user participation in the feedback process. Consequently the facilitation of this was one aim of this work. Thus the model had to combine two positions, it had to be easy to understand and straightforward and at the same time generate high-quality measures.
2 Customer satisfaction

2.1 The different understandings of customer satisfaction

Very often customer satisfaction is an abused or at least misused expression. Therefore many organisations use it as a rather casual approach to express their customers’ happiness and satisfaction with the levels of service rendered and the products and services purchased. Consequently the full complexity of the customer satisfaction construct is often neglected.

Customer satisfaction can be viewed as the overall assessment of the service provider’s performance influencing the customer’s repurchasing intention. It can also be viewed as a generalised emotion that differs from other more specific sentiments, as customer satisfaction is a blend of different perceptions of reality. Additionally, both service provision and customer satisfaction are of a relative state and not an absolute one.

Despite the affective component mentioned, customer satisfaction research has been very cognitive in nature and has generally been understood as a cognitive post-consumption process, where the customer compares the perceived performance of the service with some pre-consumption comparison standard. This understanding of customer satisfaction is also known as the disconfirmation model.

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The same idea of disconfirmation forms the basis of the perceived service quality model. Service quality is also a post consumption evaluation of the service performance compared to some preset standards.

In history it has been often discussed, whether service quality is a cause of satisfaction or its consequence. However nowadays most researchers are convinced that service quality and satisfaction are distinct constructs connected through a causal relationship and that the perceptions of service quality affect feelings of satisfaction.\textsuperscript{11,12}

One common suggestion to separate service quality and satisfaction is that the former can be seen as a primarily cognitive evaluation of a service, while the latter is based on both cognitive and affective dimensions.\textsuperscript{13}

This understanding was subsequently developed. Thus today’s understanding of satisfaction with services is affected by the level of service quality, the emotions perceived in connection with the services, and additionally the perceived value of the services purchased.\textsuperscript{14,15}

Another distinction between the two concepts was developed by Zeithaml, Berry and Parasuraman. They base their division on different pre-consumption comparison standards of the disconfirmation model to which customers measure the service performance.\textsuperscript{16}

Furthermore the concepts of perceived service quality and customer satisfaction can be understood in the context of multiple service encounters / service episodes and purchasing relationships. A relationship consists of several episodes in which the post-purchase reactions influence the next purchasing decision.\textsuperscript{17} Than these episodes again can be subdivided into smaller units the service acts.\textsuperscript{18}

Therefore the customer's overall satisfaction with the services of an organisation is based on all the service encounters / service episodes with that organisation.\textsuperscript{19} Thus it is based on the service relationship.

The service quality construct consequently relates to one single service process and one single service experience. Hence, it is not a long-term quality perception.\textsuperscript{20} Satisfaction with the service is then affected by the level of service quality, the emotions perceived in connection with the services, and the sacrifices made to obtain the service.\textsuperscript{21} Although Liljander insists that satisfaction and service quality exist in services episodes as well as in relationships and incorporates that view in her and Strandvik’s relationship quality model,\textsuperscript{22} contributing to the many opinions about customer satisfaction and service quality.\textsuperscript{23}

This work concurs with Grönroos who states: ‘Perceived service quality comes first, then satisfaction with quality.’\textsuperscript{24} A view which is supported by the notion that

\begin{itemize}
\item\textsuperscript{23} Wisniewski, Mik, 2001: \textit{Using SERVQUAL to assess customer satisfaction with public sector services}; in: Managing Service Quality, No. 6, Vol. 11, 2001, p. 381.
\end{itemize}
core service quality out of the three satisfaction dimensions has been found to have the profoundest influence on satisfaction.25

The disconfirmation model, which as described, suggests that states of satisfaction/dissatisfaction or on a subsequent level those of high/low service quality results from a comparison between one's perception of product performance and one's expectation level(s)/comparison standard(s). It proposes that a customer is satisfied when his or her experience of a product or service is better than expected. Thus a customer is dissatisfied when his experience of a product or service is worse than expected.

In consequence costumers are believed to form some kind of expectation standard to which they assess the deviation of the actual experience. Great effort has been made by scholars to identify the antecedents of customer expectations and to understand how the expectation standard is formed and what it consists of.26,27,28 Multiple models of expectation standards have been developed in the past. In his work Ojasalo identified more than 18 different expectation standards used to measure the gap between expectations and experiences in service contexts.29

A thorough understanding of the formation of these expectations appears necessary in order to reliably assess the service quality and consequently customer satisfaction.

2.2 The perceived service quality model

Generally speaking all expectations cannot be separated from service contexts as Grönroos asserts: ‘All firms, regardless of what their perceived original business
might be, are ultimately offering services to their customers.³¹ This implies that the customer no longer consumes a prefabricated product, but is actively involved in production and consumption of a service. Furthermore services nowadays include some products, but the value adding effect for the customer comes from the combination of tangible and intangible aspects of the service creation. Hence service quality incorporates both, the quality of services and product quality.

As a result the perceived service quality model with its underlying disconfirmation construct essentially forms the base for all service quality research, even though originally introduced to help managers and researchers to understand what constitutes a service in the minds of customers. It is a conceptual framework which describes how customers perceive the different attributes of services.³²

Good service or positive perceived quality is gained when the experienced quality meets the expectations of the customer, or the expected quality. Consequently bad service or negative perceived service quality is obtained when the experienced quality is lower than the expectations. Although one has to recognize that expectations can be unrealistic and result in a low perceived quality, even if the experienced quality measured is good from an objective point of view.³³ The same is obviously true vice versa. But in that case it has no negative effect on the customer.

However the expectations of a service are formed in the end, it is necessary to measure the expected service quality and the experienced service quality to estimate the disconfirmation or gap between both.³⁴ Additionally in Grönroos’ model the customer’s perception of the disconfirmation is influenced by two generic dimensions, thus the evaluation of the disconfirmation is twofold.

These generic dimensions are:

- technical quality
- functional quality

The technical quality of a service is thereby understood as the outcome of the service process, or an answer to the question ‘what?’. Therefore it describes the quality of the result of the performed work. The functional quality on the other side focuses on ‘how?’ the service was provided or the way the service process worked.  

Both the process and its outcome have an impact on the perception of the quality of the service. Additionally image then acts as a filter for the customer’s perception of the service quality. This in consequence also explains why the image of the service provider or the service as such plays an important role in service marketing and for businesses in general.

In contrast to services, it is in the case of pre-produced physical products only the outcome of the production process that counts for the customers.

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The expected service or expected quality as one component of the gap assessment differs from individual to individual. It consists of a variety of different information and forms a unique reference point for the perceived quality judgement.

The expected service is therefore understood as a function of some factors which are: marketing communication, word of mouth, company/local image, price, customer needs and values.  

As the perceived service quality model shows, expectations have a key impact on customers’ quality perceptions. In case that a service provider over-promises, it raises customers’ expectations too high and, consequently, customers will perceive that they get low quality. The level of quality may still be high (objectively measured), but if customers’ expectations are not in balance with their experiences, the perceived quality is nevertheless low.

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SERVQUAL

Several tools to measure the disconfirmation of the perceived service quality model have been developed over time. The most popular and widest applied one being SERVQUAL first developed by Parasuraman, Berry and Zeithaml in the mid 1980s.40

The SERVQUAL model evaluates the disconfirmation between expectations and experiences on an attribute level. From an initial set of 10 determinants of perceived service quality they identified five as the main drivers of those decisions. A set of 22 items or attributes are distributed among these five determinants. The measurement of the service quality is done in two steps. First respondents are asked to rank their expectations before the purchase of a service and subsequent their perception of the service performance. The scale used for the ranking is of a seven point Likert-type, ranging from ‘strongly disagree’ to ‘strongly agree’.41

The five determinants of perceived service quality investigated are:

- Reliability
- Responsiveness
- Assurance
- Empathy
- Tangibles

Reliability

Reliability is the level of accurate service obtained. This accuracy includes an error free delivery without any problems. Furthermore it has such service features as agreed upon beforehand. The outcome of the service process is therefore as it should be, hence it is as promised.

Responsiveness
Responsiveness is the grade to which the service provider’s employees are able and willing to inform the customers about the service and when and how it will be provided. Additionally it refers to their willingness to help the customers. Thus one can understand it as the promptness and volume with which information is exchanged.

Assurance
Assurance means, that the employee’s have the appropriate knowledge to answer customers’ questions. Additionally their behaviour is always in a way that the customer feels safe. This includes among other virtues courteousness and good manners.
Empathy

By empathy is meant the personal attention customers receive from the service providers’ employees. It also contains the ability of the service provider to understand customers’ problems and act in their best interest. Opening hours are one example for this.

Tangibles

Tangibles refer to the physical appearance of service providers’ equipment and facilities. They also include the appearance of the service providers’ employees. Additionally the appropriateness of materials used by the service providers’ falls in this category.

There have been suggestions that, since the SERVQUAL items appear to be good predictors of service quality when measured at the level of the firm’s services, they may also be good predictors of overall service satisfaction, when measured as a function of multiple experiences with the firm.\(^\text{42}\)

Nevertheless as Grönroos points out, there has also been some controversy regarding the use of the SERVQUAL instrument. Though the determinants have been reported stable over various types of services in many studies, the set of five standard determinants have not been found in others. It was also found that the 22 attributes used in the original instrument do not always accurately describe all aspects of a given service.\(^\text{43}\)

In short the critic includes the use of difference scores, the dimensionality, the applicability and the lack of validity of the model. The lack of validity is addressed with regard to the dependence and independence of the five dimensions.\(^\text{44}\)

The SERVQUAL scale should be applied carefully, and the determinants and attributes of the instrument should always be reassessed in any situation, before


the instrument is used. Services, as well as markets and cultural environments, are different. It may be necessary to add new aspects of the service studied to the original set of determinants and attributes, and sometimes to exclude some from the measurement instrument used. From a managerial point of view, when trying to understand what constitutes a given service, the five determinants and also the original ten determinants give a valuable starting point for the development of an understanding of what aspects characterise the service that is provided. However, when using a SERVQUAL-type of approach to measure perceived service quality one should always carefully customise the set of determinants and attributes used to the specific situation at hand.\footnote{Grönroos, Christian, 2001: Service Management and Marketing: A Customer Relationship Management Approach, 2nd edition, John Wiley & Sons, Chichester, 2001, p. 76.}

When characterising the five SERVQUAL dimensions and comparing them with Grönroos’ two determinants of service quality one recognises that overall SERVQUAL concentrates on measuring the way the service is provided, hence the functional quality of services. Only the reliability dimension includes parts of the technical quality evaluation. Therefore the five SERVQUAL dimensions fall underneath the two Grönroos dimensions as following:

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Technical Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td></td>
</tr>
<tr>
<td>Assurance</td>
<td>Functional Quality</td>
</tr>
<tr>
<td>Empathy</td>
<td></td>
</tr>
<tr>
<td>Tangibles</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 – SERVQUAL dimensions in relation to Grönroos’ perceived service quality dimensions

As already stated, the SERVQUAL instrument, even though widely applied, has some deficits. As Kang and James state it is at least questionable if the five proposed dimensions offer an explanation for each service assessment. Likewise the 22 items suggested are unlikely to be the same in every service context. Therefore one can ask, in how far the SERVQUAL instrument offers reliable
insights. The perceived service quality model thus includes in its approach the emphasis of SERVQUAL and proposes a more comprehensive solution.\textsuperscript{46}

![Diagram: Relationship between SERVQUAL and Grönroos's perceived service quality model]

Additionally facility maintenance services are by nature relatively close to products and their determining technical quality as will be shown later in this work. Therefore a concentration on functional quality aspects deems not acceptable.


2.3 The zone of tolerance model

Although it has been assumed that the level of disconfirmation is directly related to the satisfaction level / perceived service quality level, this symmetry has been challenged by the idea of different perceived zones of tolerance.\textsuperscript{48,49}

In their article on “The Nature and Determinants of Customer Expectations of Service” Zeithaml, Berry and Parasuraman postulate a generic model of customer expectations based on focus group interviews.\textsuperscript{50} The new model is derived from the author’s earlier works with the SERVQUAL tool and extents on their understanding of the expectations to which the actual service performance is measured. Thereby Zeithaml, Berry and Parasuraman differentiate between service quality and customer satisfaction in the way that the former is a disconfirmation between expectations and performance while the later is a disconfirmation between the prediction of a certain level of service and the actual performance. This work nevertheless concurs with Liljander’s objections that this understanding of customer satisfaction is not in accordance with the customer satisfaction research tradition, since customer satisfaction has always been measured against some form of expectation or comparison standard.\textsuperscript{51} Nevertheless the suggested model adds profoundly to the understanding of customer expectations in perceived service quality contexts.


Figure 3 – Zeithaml's, Berry's and Parasuraman's model of service expectations

The authors' proposed model is divided into four main parts:

1. the expected service component
2. antecedents of desired service
3. antecedents of adequate service
4. antecedents of both predicted and desired service

Expected service component

The expected service component is a normative standard and establishes a level of what customers hope to receive from a service. It is termed the “desired level” by the authors. The desired service level is understood as a mixture of what

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customers think “can be” and what “should be”. Thus it sets up a stable cognitive point of reference for the evaluation of the perceived service quality.

Furthermore the authors point out that customers realise that this normative based level of service quality is not always reachable. Therefore they have another, lower level of expectation. This lower level of expectation is called ‘adequate service’. It represents the minimum requirement customers have towards a service.

The area between these two expectation levels has been named ‘zone of tolerance’, indicating that customers accept a service performance within these limits.

![Figure 4 – Zone of Tolerance model (static)](image)

Also it has been found that the zone of tolerance can vary in size based on the individual preposition of the customer expectations. This variation in size of the zone of tolerance is due more to an inconsistency of the adequate service level than to a change in the desired service level. What is perceived as an adequate service level, changes for each individual due to the context in which the service is provided. The main adaptation is therefore found on the lower border of the zone of tolerance. The upper border is far more stable and consistent as the desired level only changes little by little due to its normative character. The desired service level of customers only rise through new experiences and the influences these
experiences have on their future desired expectations. This phenomenon, also known as adaptation theory, is found to be incremental by nature.\textsuperscript{54}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure5.png}
\caption{Zone of Tolerance model (dynamic)}
\end{figure}

\textbf{Antecedents of desired service}
As already stated, expectations are as divers a people are. Thus so are the antecedents of service levels. Zeithaml, Berry and Parasuraman found indications that the desired service level is influenced by two antecedents, namely:\textsuperscript{55}

1. enduring service intensifiers
2. personal needs


Enduring service intensifiers
By enduring service identifiers the authors understand: “individual, stable factors that lead the customer to a heightened sensitivity to service”. One of those is the “derived service expectation”. Service expectations are derived, when customers transfer or include expectations others have towards them into their own expectations of services.

Also the “personal service philosophy” is an enduring service intensifier. It is nothing else than the underlying basic assumptions and attitudes customers have about the conduction and the meaning of service provision.

Personal needs
Personal needs on the other hand are factors that contribute to the well-being of the customer, be it physically, socially or psychologically. These needs are highly subjective and express themselves in diverse expectations across customers of one and the same service provision.

Antecedents of adequate service
The level of adequate service is found to be influenced by the following five antecedents:

1. Transitory service intensifiers
2. Perceived service alternatives
3. Customer self-perceived service roles
4. Situational factors
5. Predicted service

Transitory service intensifiers
The authors understand by transitory service intensifiers temporary and mostly short-term increases in sensitivity towards a service provision. As an example personal emergency situations are described. In this kind of situations the level of adequate service rises and the zone of tolerance shrinks. Also problems with the

initial service can lead to a rise in the adequate service level as customers expect a better solution/compensation in the following service provision.

**Perceived service alternatives**

The foundation of perceived service alternatives is the perception of the customer to acquire a better service from another than the original service provider. Perceived service alternative works in situations where the service can be obtained from a variety of service providers or it is self-produced.

**Customer self-perceived service roles**

Zeithaml, Berry and Parasuraman define the self-perceived service role as the extent to which customers influence the level of service they receive. As a consequence customer expectations are biased by how good they perform their tasks if the service depends on their participation. An underperformance on their behalf results in an expanding zone of tolerance and a lower adequate service level, while on the other hand a good performance raises the level of adequate service and therefore narrows the zone of tolerance.

**Situational factors**

Situational factors are factors that the customers perceive as not to be influenced by the service provider and which are not the service provider’s fault. Natural disasters would for example fall into this category. During such situations customers therefore tolerate a service level which would deem unacceptable under normal circumstances. Consequently situational factors widen the zone of tolerance and lower the adequate service level as long as the extraordinary circumstances persist.

**Predicted service**

Predicted service is understood as the anticipation of a certain service level by the customer. Or in other words, it is the level of service the customers believe they will receive. Predicted service is furthermore found to only indirectly influence the adequate service level while Zeithaml, Berry and Parasuraman understand it as having a direct influence on customer satisfaction.
**Antecedents of desired and adequate service**

Common antecedents of desired and adequate service are categorized by the authors in the four following sets:

1. Explicit service promises
2. Implicit service promises
3. Word-of-mouth communications
4. Past experience

**Explicit service promises**

Explicit service promises are such statements that the service provider makes towards customers. These statements can be divided either into personal or non-personal communication. Whereas personal communication includes statements from the service providers personnel, non-personal communication consist e.g. of advertisements or promises made in contracts. These explicit promises are found to raise both, the desired as well as the adequate level of expectations.

**Implicit service promises**

Implicit service promises contain all kinds of promises which have not explicitly been given to the customer, but are influencing their expectations. So they can be understood as interferences about what the service should achieve and how it will be performed. Prices and tangibles are both found to be the main sources of information from which customers derive these expectations. Hence they are also often perceived as representatives of quality.

**Word-of-mouth communications**

Word-of-mouth communication originates always from third parties and not from the organisation itself. It is dominated by personal communication but non-personal communication is also possible and has a high influence on the service performance customers expect. Its high influence on expectations grounds in two attributes: First, word-of-mouth communication is believed to be unbiased and secondly, due to the nature of services they are difficult to evaluate prior to purchase and experience.

Word-of-mouth communication has consequently been found to influence both, the desired service level as well as the predicted level.
Past experience
Finally the customers past experiences with the service at stake and/or related services are also found to influence its levels of predicted and desired service. Possible experience norms to which the judgement is made include the affected brand as well as the favourite brand or the last purchased brand. Furthermore, believes about the industry standard blend into the expectations.

2.4 Expectation types
In his work concerning professional services Ojasalo identifies different expectation types incorporated by customers. The phenomena he found based on his empirical research have different effects on the disconfirmation process. So do some customers not always have a clear understanding of what they want from the service provider, whereas others can voice their expectations accurately. This is challenging for both parties involved in the purchasing of services, as only those expectations precisely expressed and agreed upon can be provided with a high certainty.

The expectation types Ojasalo identifies include:57

- Fuzzy expectations
- Precise expectations
- Explicit expectations
- Implicit expectations

Fuzzy expectations
These are the kind of wishes customers have but cannot voice clearly. Fuzzy expectations are inherent in their spectrum of expectations but they are not consciously aware of them. Thus, customers have fuzzy expectations when they expect something but do not have a precise picture of what this ‘something’ should be.

Precise expectations
Precise expectations are understood as reversals of fuzzy expectations.

Explicit expectations
Explicit expectations are conscious assumptions or wishes about the service in the customer's mind. The customer pays explicit attention to whether these expectations are met and knows clearly what went wrong if they fail.

Implicit expectations
Implicit expectations are associated with situations in which some characteristics or elements of the service are so self-evident that customers do not actively or consciously even think about them, or about the possibility that they will not materialise.

Customers may start to consider some service-related characteristics as self-evident facts during a customer relationship, especially after a long common history.

Fuzzy, precise, implicit and explicit expectations can all be both realistic and unrealistic.
Unrealistic expectations are such expectations which are impossible or highly unlikely for any service provider, or the customers themselves, to meet. Realistic expectations are the reversal of those and therefore the ones that are likely to become real. Hence the probability that customers’ expectations will become real consequently depends on how realistic their expectations are, which in turn is likely to lead to high customer’s perceived service quality. Basically, a good match between expectations and experiences is more likely when expectations shift downwards and/or when the execution of the actual service which constitutes the experience shifts upwards.
3 Measurement of end-user satisfaction in facility maintenance services

3.1 End-user satisfaction in business-to-business contexts

As Rossomme points out, there are still gaps in the research of customer satisfaction in business-to-business contexts. Even though many studies of business-to-business satisfaction measurement utilize the consumer satisfaction approach, these studies face a validity problem. Rossomme proposes therefore, when measuring satisfaction in such an environment one has to address all relevant members of the client organisation. Otherwise the special circumstances of inter-organisational relationships are not properly addressed. In business-to-business settings the satisfaction measurement of purchasing processes involves many different people. The correct identification of the relevant target group is thus crucial for the quality of the customer satisfaction measurement. Normally the people involved are identified by their organisational roles, but one has to distinguish between natural persons and judicial persons in this setting. In the organisational hierarchy the natural persons act as certain roles, they inherit from their functions within the organisation. As the owner of these roles they have to fulfil specific tasks in the purchasing process. Nevertheless they still have individual needs. The roles involved during the procurement can be classified into the following groups:\textsuperscript{58}

- decider
- influencer
- gatekeeper
- buyer
- user

The groups can be differentiated from each other by the influence they have on the purchasing decision. While those persons who finally select and approve the suppliers are termed ‘deciders’, ‘gatekeepers’ are those people who control the information flow within the buying centre. Specifications and possible alternatives

are provided by ‘influencers’, whereas ‘buyers’ are the ones who have formal authority over the purchase. Users in Rossomme’s understanding ‘[..] are those employees who will have experience with the product or service.’ Hence the users of purchased products or services form only one of the groups involved in the buying process.

In this specific study this user group consists of all employees of the buying business. Therefore this group does include some users involved in the buying process, whereas most are unconnected to it.

As a result, Rossomme acknowledges that in business-to-business satisfaction measurements end-users ‘will [often] […] have [no] direct consumption experience with the product or service […] they are asked to judge.’

Some of the specialities which have to be taken into account in business-to-business contexts are the small influence end-users have on the selection of the service providers and especially the fact that they do not have to pay personally for the received services.

### 3.2 End-user expectations of facility maintenance services

End-user expectations of facility maintenance services are influenced by their level of involvement in the service process as well as their perception and knowledge of the service. If there is hardly ever an interaction between the end-user and the service provider, end-users are unlikely to know about the service process at all. Therefore the service provision happens below their threshold of awareness.

As Fritzsimmons, Boh and Thies point out, this situation most often occurs when highly standardised services go along with a low level of interaction. This features most maintenance services on the end-user level well, since they are customised on the client level which is also where most of the interactions evolve. In facility maintenance services the objects of the service are the building systems. That is

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things and only indirectly the end-users, although facility maintenance services of course ultimately aim to facilitate their work and enhance their productivity. Additionally, as maintenance services deal with maintaining physical things, the service process is oriented towards the tangible building systems. Consequently the presents of the end-user is not required to accomplish the service.\textsuperscript{61, 62}

Furthermore focus group interviews indicate that end-users normally just use a given environment. They take it as granted that the facilities provided by their organisations work to support them. Hence that this function needs to be maintained is out of their focus. Only cleaning services form an exception as they are often performed during office hours and in public spaces and therefore some form of interaction exists.

On the other hand Fitzsimmons, Noh and Thies have characterised property related services as those services with the most adjacency to products in their classification scheme. Hence the service process dimension has less influence on the perceived quality of the service than in other service fields.\textsuperscript{63}

The outcome dimension of the service provision is therefore more important as the way the service is provided.

Thus if they do not know about them or if they are not aware of them, it is hard to have an expectation about how the services should or will perform.

This goes hand in hand with the differences in expectations already noted. As seen, implicit expectations are those expectations customers are not aware of having them. Hence it is impossible for them to voice those expectations and formulate requirements. The expectations would have to be brought to the surface of their consciousness first. As this would require extensive resources and thus disable a broad application of the measurement in terms of timeliness and total responses, it is inappropriate. It also would influence the validity of the findings as this would trigger a high level of awareness which would not exist in normal

circumstances. Therefore an approach assessing the disconfirmation between expectations and experiences like in the popular SERVQUAL tool is not appropriate in this context.

As Ojasalo says: ‘The existence of implicit expectations becomes obvious when they are not met.’\textsuperscript{64} This means that end-users only realise their expectations when the service experience falls below what they unconsciously deem as acceptable. Hence the service performance drops out of their ‘Zone of Tolerance’ as Zeithaml, Berry and Parasuraman would term it.\textsuperscript{65}

3.3 Measuring end-user dissatisfaction in facility maintenance services

3.3.1 Service failures
Michel defines a service failure as reported mistake or error, leading to dissatisfaction.\textsuperscript{66} Thus all perceptions pertaining facility maintenance services which end-users report can be understood as service failures. This also includes complaints about the service voiced by end-users.

When the awareness threshold is crossed service failures are reported, thus implicit expectations about the facility maintenance service performance become explicit. Reported service failures are therefore end-user’s reactions to a service performance which is out of their zone of tolerance boundaries. Thus if the facility maintenance services do not meet their idea of an adequate service level, end-users are dissatisfied and voice it. As Liljander and Strandvik point out, the reporting of service failures is even more likely than those of service excellence, since lower than adequate performance is found to cause more severe responses

\textsuperscript{65} The zone of tolerance model, p. 24.
as higher than desired performance. Therefore a drop below the acceptable level triggers some reaction by the customer.\textsuperscript{67}

Customers have two possible reaction schemes when they find themselves in such a situation: They can either voice their dissatisfaction or they can opt to keep quiet, which in turn leads to inner demission. The extend they choose the latter option is dependent on the ease with which dissatisfaction can be voiced. Hence the usability of the feedback system is important to facilitate a high level of interaction with upset customers. This interaction then enables the service provider to start a service recovery process, which when perceived satisfactorily leads to a high level of customer satisfaction with the overall service provision.\textsuperscript{68}

Consequently service failures and their successional service recoveries can be a basis for end-user satisfaction measurement in facility maintenance service.

### 3.3.2 Service recovery

As indicated the service quality of the recovery process is important once the end-users are aware of the facility maintenance services. How this process is handled decisively influences the overall perception of service quality and therefore customer satisfaction. Each service recovery can thereby be viewed as a single service encounter / or service episode. Therefore it is possible to apply the findings laid out so far. End-user satisfaction can be measured on this level as well. Thus the service recovery process becomes an agent of the overall facility maintenance service provider’s performance. One has to take into consideration, that whenever the service is not satisfactory and an end-user reaction is provoked, this reaction can be twofold: On the one hand dissatisfied end-user voice their now explicit expectations and start a service recovery process by submitting a service request or complaint, while others just turn quiet and give up. The division of the two groups depends on how easy and usable the complaint mechanism is. To address a huge as possible amount of end-users a low threshold for complaints or service


requests is therefore necessary. Thus all end-users must have access to the service request mechanism.

### 3.4 Customer satisfaction scales

#### 3.4.1 Semantic-differential scales

There are different kinds of scales in use for customer satisfaction measurement. Generally most of them are based on a Likert scale (multiple-choice) which consists either of an even number of possible answers or an odd number.

The measurement of the disconfirmation can also be classified into:

- Objective disconfirmation
- Inferred disconfirmation
- Direct disconfirmation

Whereas objective disconfirmation refers to a laboratory environment for the assessment, while inferred disconfirmation uses both an expectation scale and a performance scale which are than evaluated against each other.

A further group consists of direct disconfirmation assessments were questions about the difference between expectations and experience build the base for the survey design.

In his work Waddell gives an overview of five different scales used in satisfaction assessments: 70

Hence there are Performance scales in use, measuring service attributes with choices like ‘superior’, ‘excellent’, ‘good’, … . Unfortunately users tend to give too positive answers to questions like this and it is unclear or at least individually different what e.g. ‘superior’ in a certain context means. Furthermore the descriptions used might differ in their meaning from culture to culture, thus changing the overall assessment.


Satisfaction scales are constructed in a way that they ask the respondents to judge a set of attributes or services on how satisfied they are with an item. This technique also tends to produce too positive judgements. It also shares with the Performance scale the weakness of individual interpretation; the reference for the judgement is not known.

Expectation scales evaluate attributes by asking how the customer perceived the service: ‘much better than expected’, ‘better than expected’, ‘about as expected’, ‘worse than expected’, ‘much worse than expected’. Unfortunately the knowledge of the expectations is necessary to be able to draw conclusions from the gained data; expectations could i.e. be negative and therefore easily result in a positive answer without necessarily meaning that the customer is satisfied. Additionally, expectations might change over time, thus resulting in a different rating and therefore disabling correct interpretations if the performance of the attribute has changed or the expectation or even something else.

Requirement scales ask for a customer judgement through the use of choices like: ‘exceeds my requirements’, ‘met my requirements’, …, ‘failed to meet my requirements’. Obviously there are attributes that can never exceed customer requirements i.e. accuracy of a bill. It also has another deficit when measuring the performance of variable services. A variation of the requirement scale using terms like ‘usually meets my requirements’, …, ‘never meets my requirements’ is suitable for measuring variable services, but lacks the capability to explain fixed attributes.

All of these traditional scales can be classified as Likert based semantic-differential scales. Variations of these scale types are dichotomous-adjective scales which define only the scale’s end points. This is found helpful as it eliminates cultural bias from the semantic-differential scale, but unfortunately the other shortcomings of semantic-differential scales persist.

Another approach for a scale basically turns the ones mentioned above upside-down. By asking the customer for improvement needed to meet their demands/needs it avoids some of the weaknesses of the traditional scales. It is suggested that the customer is given three choices: ‘no improvement needed’, ‘some
improvement needed’, ‘considerable improvement needed’. By asking the customer directly if improvement is needed the scale avoids ambiguous answers as the scale does not need interpretation. This clear definition of improvement needed helps both, the customer when filling in the questionnaire as well as the researcher / manager when drawing conclusions. Furthermore customers tend to be more critical compared to the use of the traditional scales. Therefore too positive answers are evaded. The improvement-needed scale can also be applied to fixed services as well as to variable services and to those services where the performance cannot exceed the requirements.\(^71\)

The improvement needed scale is therefore moving away from the semantic-differential scales into the direction of another scale type, the propositional-descriptive scales.

### 3.4.2 Propositional-descriptive scales

Propositional-descriptive scales take another approach to measure customer satisfaction. Within propositional-descriptive scale types the choices offered by a Likert scale are replaced by constructed propositions in order to provide a clear and understandable description of possible customer experiences. A possible example would be like this:

> ‘How would you rate the performance of the in-flight crew today?
> (1) anticipated your needs and made you feel that they were genuinely pleased to serve you;
> (2) were pleased to serve you and provided assistance when asked;
> (3) made you feel like they were just doing their jobs;
> (4) often neglected your needs even when asked.\(^72\)

As a result propositional-descriptive scales achieve the objective of unambiguity by somewhat clear propositions of services levels, which in turn give the respondents a reference to which they can assess their experiences. Consequently this scale avoids too positive answers when customers are somehow reluctant to say

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\(^{72}\) Lawson, Sean; Glowa, Tim, 2000: *Satisfaction measurement: Is it worth it?*; in: Quirk's Marketing Research Review, October, 2000, p. 3.
something critical. Additionally cultural vagueness is also reduced compared with semantic-differential scales.

The table below gives an overview of the different scale types and their orientation.

![Figure 6 – Overview of customer satisfaction measurement scales](image-url)
4 Concept for measuring end-user dissatisfaction

4.1 Measuring service quality

Focus group interviews conducted prior to the development of the measurement model showed that end-users are unwilling to respond to lengthy surveys and are unlikely to answer any questions which are difficult to understand. The end-users’ main objective is their own work and not facilitating the business of supportive functions in the organisation.

Consequently one main requirement for the end-user satisfaction evaluation was a short and simple method of acquiring the needed data. If the end-users would not participate the whole measurement would become pointless. Thus this end-user disposition became an important guideline in the creation of the measurement model. A solution had to be found which took their neglect into account.

In addition to the above mentioned facts, by measuring the perceived service quality the disconfirmation between expectations and experiences is evaluated. However, it has been seen that expectations are a difficult phenomenon to measure reliably. Due to their nature they are fluctuating with the environmental changes. This concurs with Liljander’s dissertation in which she proved, that thus the measurement of the disconfirmation in service quality measurement is theoretical beneficial it has only a negligence effect on the quality rating. Additionally this avoids the methodological difficulties of measuring expectations after the (expectations altering) consumption of a product or service. Therefore she suggests abandoning the pre-consumption assessment and concentrating only on the post consumption experience.73

Grönroos agrees with his findings and reviewed his perceived service quality model accordingly. Hence he now proposes a modified perceived service quality model as such.74

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Perceived service quality is still a disconfirmation between expected and experienced service, but it is sufficient to measure only the experienced service. The service expectations are neglected for the measurement of the service quality. Hence the experienced service is perceived through the lens of image and consists of technical and functional quality perceptions. The evaluation of service quality is done solemnly on the basis of the perceived service performance.

Customer satisfaction has been defined in this work as the evaluation of service quality, emotions and value perceived by the customers. In the context of end-user satisfaction in facility maintenance services perceived value is ruled ineffective since the end-users do not pay for the services obtained themselves. Therefore notions of value as a judgement of service performance against sacrifices (money wise) are weak, as they would require knowledge of the price paid for the services. Or in other words, since the end-users were found to be unaware of facility maintenance services they also lack the possibility of a value judgement. And even if they perceive facility maintenance services consciously they lack the information about the service fee for a value appraisal.

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76 2.1 The different understandings of customer satisfaction, p. 11.
77 3.2 End-user expectations of facility maintenance services, p 34.
Emotions connected with the service provision on the other hand are not bound to such restrictions. They will be experienced by the end-users. Hence, has this work ignored them so far? As Kang and James show in their integrative model the five SERVQUAL dimensions can be incorporated into the functional quality dimension of the perceived service quality model, whereby the SERVQUAL dimension include emotional aspects like empathy and assurance. Thus, through the functional quality dimension emotional aspects of service provisions are contained into the proposed framework.

Consequently the perceived service quality model offers the integration of an umbrella model which includes all three customer satisfaction constituents.

4.2 ‘Hot evaluation’ of end-users service requests

4.2.1 Perceived technical quality of the service recovery
As seen so far the proposed model adds to the understanding of end-user satisfaction in facility maintenance services. But how are the different levels of satisfaction assessed in real life? How are they actually evaluated? Two methods are possible: an evaluation directly after the service delivery (HOT) and an evaluation after several service deliveries (Cold). Consequently the first method would measure a single service encounter while the latter would measure multiple encounters. Hence a direct evaluation after the service performance would be in line with the service quality definition given earlier in this work, while a multiple encounter evaluation reflects the understanding of customer satisfaction. On the other hand multiple hot evaluations can be summed up to an overall evaluation – customer satisfaction – while offering at the same time the benefits of mid-period measurements. Thus hot evaluation results can be used in the operational management in order to monitor trends in the service performance and intervene if necessary. Additionally it offers the opportunity to evaluate not all year around services, e.g. winter services. Furthermore the evaluation results are more precise, as the time gap between service provision and evaluation is smaller and the service performance therefore easier to recall. Also the influence of the individual mood is reduced compared to the cold evaluation due to a greater sample size. In
the following a model for a hot evaluation of facility maintenance services is developed.

As seen in the previous chapter, end-user participation is the key factor for a successful evaluation. Thus how to achieve this high level of participation is the question at hand, albeit the known unawareness of facility maintenance services of the end-users. As laid out before the usability of the tool has to be high in terms of accessibility and in ease of use. The proposed model reflects these by evaluating the service performance through a survey with only two questions. One for each of the perceived service quality dimensions.

As seen in the sub-chapter on satisfaction scales, there are many ways to obtain data. Some are offset by cultural bias, others offer the possibility for interpretation. To smoothen the evaluation progress different scales for each of the perceived quality dimensions are suggested.

Furthermore not each service request necessarily has to be evaluated. If the number of service requests is big enough a sample of the overall is sufficient. In order to assess all facility maintenance services evenly and to avoid bias of the findings a correct sampling method has to be chosen. In this particular case the samples have to reflect the differences among facility maintenance services. Therefore a sampling by different facility maintenance service categories is advisable.

Since the outcome of a facility maintenance service provision has, due to its physical product closeness, been found to have a great effect on the quality perception a valid and reliable tool is needed. For the technical quality assessment one scale which avoids the mentioned shortcomings is the ‘improvement needed’ scale. Additionally it is easy to understand. Therefore it is recommended to assess the perceived technical quality by asking the end-users to judge the service performance on a three point scale, ranging from:

- ‘no improvement needed’ (3)
- ‘some improvement needed’ (2)
- ‘considerable improvement needed’ (1)
‘No improvement needed’ thereby indicates a satisfactory outcome locating the service performance within the respective zone of tolerance, while other ratings reveal different levels of dissatisfaction or a performance below the adequate service level. Hence the assessment directly identifies areas of strength and weakness in the service provision and therefore not only contributes to the satisfaction measurement but is also helpful for the operational management as it allows immediate or short term reactions.

The question of scale validity is solved by asking the end-users to rate the ‘improvement needed’ in the outcome of the service provision. As described in the chapter on scales a vague or unclear understanding of the research question is avoided as well as a cultural based bias due to the fact that the reference point for the improvement judgement is the individual, in other words the object of the study. So as exactly what each individual understands by the question is the reference, different understandings by different persons do not alter the findings. Hence construct validity is assured. Furthermore the problem of convergent validity does not arise in this context since the perceived technical quality assessment is collapsed into a single question. Thus validity is secured by construct validity.

Attention to the issue of reliability is paid through the scientific procedure of this work. Hence reliability is assured by the way this work arrives at its conclusions.

4.2.2 Perceived functional quality of the service recovery
As the second part of the twofold service recovery evaluation the perceived functional service quality is addressed. Since the functional quality integrates the aspects of ‘how’ the service is provided and the emotions connected with it, a different scale than that for the technical quality assessment is suggested. Nevertheless the restrictions concerning scales apply here as well. Therefore it is suggested to evaluate the functional quality by using a propositional-descriptive scale rather than a semantic-differential scale. Hence avoiding cultural bias and ambiguity by describing situations and asking the respondents how they rate the service performance for their service request in respect to the scale’s suggestions.

The following scale is recommended:
• anticipated your needs and made you feel that they were pleased to serve you (4)
• were pleased to serve you (3)
• made you feel like they were just doing their jobs (2)
• neglected your needs (1)

Services that ‘anticipated your needs and made you feel that they were pleased to serve you’ (4) consequently rank at the upper end of the zone of tolerance and are at the desired service level, while those which receive a ‘were pleased to serve you’ (3) fall into the tolerance zone. A functional quality of one or two as assigned to the remaining values indicates a service performance below the zone of tolerance, thus leading to dissatisfaction.

Through the use of a proposition-descriptive scale a high level of validity is secured when measuring functional service quality. Proposition-descriptive scales eliminate ambiguity by creating the image of a situation in the respondents’ brains. Hence the ratings of the service quality occur to one and the same reference point created by the scale. Therefore construct validity is assured. As when measuring technical service quality the issue of convergent validity does not arise due to only a single research question asked.

Additionally reliability is like in technical quality achieved through the scientific process by which this work derives its conclusions.
All in all, the model for evaluating end-user satisfaction can be described as the following process.

![Diagram of end-user satisfaction measurement](image)

Figure 8 – Model of the end-user satisfaction measurement

As Figure 8 shows, there is no connection between the end-user and a well functioning facility maintenance service. Only when service failures occur, the end-user’s border of perception is crossed and a service recovery process is triggered.

### 4.3 Performance indicators

#### 4.3.1 The perceived functional quality index

The perceived functional quality is assessed through the functional quality feedback. The question evaluating functional quality uses as suggested a propositional-descriptive scale. The scale’s four different statements are related to four nominal values rating form four (best statement) to one (worst statement). The functional quality index is derived by summing all functional quality feedbacks and calculating their mean value. Since the sampling of the feedback data is done
by each facility maintenance service category separately an equal treatment of the data is assured. No service category is overrepresented in the dataset. Hence the total value of the functional quality assessment can be directly computed and then divided by the number of responses to derive the mean functional quality value. The mean functional quality value is hence termed functional quality index (FQ).

\[
FQ = \frac{\sum_{i=1}^{n} FQ_{\text{resp}}}{n}
\]

With \(FQ_{\text{resp}}\) = the value of each functional quality response

\(n\) = the number of responses

### 4.3.2 The perceived technical quality index

Like the functional quality index, the technical quality index (TQ) is also the sum of all values of technical quality feedbacks divided by the amount of feedbacks. Also the sampling mechanism is the same than for the functional quality index. Hence the mean technical quality value is correspondingly calculated. Thus the only difference between the two assessments manifests in the scale used for the evaluation. The technical quality index is computed as following:

\[
TQ = \frac{\sum_{i=1}^{n} TQ_{\text{resp}}}{n}
\]

With \(TQ_{\text{resp}}\) = the value of each technical quality response

\(n\) = the number of responses

### 4.3.3 The end-user satisfaction index

Both the functional and the technical quality index are integrated into the key performance indicator for end-user satisfaction in facility maintenance services. Additionally weight factors extend the formula so that it can be easily tailored to different business needs and circumstances. A correction factor for the different
nominal scales is also included, removing the weight bias otherwise introduced by this deviation.

\[
KPI_{\text{End-user satisfaction}} = \sum \frac{\alpha(FQ) + \beta(b * TQ)}{FQ_{\text{max}} + b * TQ_{\text{max}}} * 100[\%]
\]

The formula is build out of four parts, the numerator put together by the service quality addendums \( \alpha(FQ) \) and \( \beta(b * FQ) \), the denominator consisting of the \textit{scale maximums} for both functional and technical quality, and the \textit{percentage factor}. Whereby \( \alpha \) and \( \beta \) in the addendums represent weight factors through which the influence of each quality dimension can be fine-tuned. \( b \) is the correction factor by which the value difference in the scales of functional and technical quality is addressed. Thus \( b \) is defined as:

\[
b = \frac{FQ_{\text{max}}}{TQ_{\text{max}}}
\]

\( FQ_{\text{max}} \) and \( TQ_{\text{max}} \) are the maximal values of their respective scales.

The end-user satisfaction index is thus a comprehensive indicator how end-users perceive facility maintenance services and it therefore offers an aggregated view of the maintenance service performance.
5 Conclusion

The end-user satisfaction model proposed in this work is derived by the special settings in which facility maintenance services are perceived. Therefore its explanatory function is limited to those settings. The model obtained through a comprehensive literature review and focus group interviews / discussions uses a practical rather straightforward approach in order to facilitate a high level of end-user interaction.

By stripping the prevailing customer satisfaction construct from its unsuitable parts for the described setting the model arrives at the originally distinct construct of service quality as the solemnly indicator of end-user satisfaction in facility maintenance services. On the first view it might be argued that by doing so essential information for the assessment of the end-user’s perception and evaluation of the facility maintenance services is lost. As argued this is not the case in this setting. Essentially all perceptions end-users possess with regard to facility maintenance services are assessable through Grönroos’ perceived service quality model and can be evaluated during the service recovery process.

Nevertheless the diverse opinions on customer satisfaction and service quality and the lively ongoing debate show that the researched area is still far from a solid, unanimous accepted theory. Therefore new insights which will be found in the future might require a reassessment of the proposed model.

One limitation of the work concerns the applicability for small businesses, as the positive effects need to overcome the initial costs for the ongoing evaluation.

Any chosen organisation aiming to measure customer satisfaction needs to integrate this measurement into its customer focused strategy. Due to a small dataset of five focus group interviews / discussions the findings could be limited. One cause for this would be the special circumstances the data was gained in. Hence this would restrict the statement of this work to the Finnish facility service market.
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