2013

A hospital service quality measurement model from an internal customer perspective

A case study within Isala klinieken

Moniek Dekker
20 February 2013
Wageningen University

MSC THESIS

A hospital service quality measurement model from an internal customer perspective

A case study within Isala klinieken

Msc. Thesis Management Studies – Facility Management

Msc Thesis:	MST-80433
Student:	Moniek Dekker
Studentnr.	871230-175-010
Email:	moniek.dekker@wur.nl
Study:	Master Management, Economics and Consumer Studies
Profile:	Facility Management
Supervisor:	Drs. H.B. Kok
Chair group:	Management Studies
Email:	herman.kok@wur.nl
Co-reader:	Dr. M.P. Mobach
Chair group:	Management Studies
Email:	mark.mobach@wur.nl
Firm supervisor:	Dhr. H. Prinsen
Email:	prinseh@isala.nl

20 February 2013, Zwolle

Abstract

Measures of service quality have become a widely used standard of business performance. Especially in marketing literature service quality is extensively researched. However, the studies are mainly focussed on external customers instead of on the internal customer. Within FM, the literature on internal service quality is also scarce. Nevertheless, providing the internal service quality is important to deliver good external service quality. This study contributes to literature on internal customers especially in a hospital context. The research aims to investigate how internal customers in a hospital context perceive the internal service quality of facilities services like catering, cleaning, procurement and technique and maintenance. Through a literature review and a case study within Isala klinieken (a Dutch hospital) consisting of in-depth interviews and a questionnaire data was gathered. After a PCA, multiple regression analysis and a paired sample t-test the following conclusions were drawn. Although according to literature ISQ is based on dimensions relating to aspects of services (i.e. reliability, response, empathy etc.) the case study indicated otherwise. End-users and customers perceive ISQ based on both similar and some distinct dimensions. End-users (staff at operational level) perceive the internal service quality based on 23 dimensions which are mainly on entire services (i.e. catering, security, safety etc.). For some of these services a distinction is made between interaction, physical environment and/or outcome quality. For instance, the staff restaurant is based on interaction quality and based on the physical and outcome quality. On customer level (staff at tactical level) the internal service quality dimensions seems to be similar however more dimensions can be added like providing management information. The dimensions which are the most important, and therefore are the most important predictors of the overall ISQ of IF, are first procurement, second maintenance condition, third printers & waste, fourth cleaning and fifth meeting rooms.

Key Words: Service Quality, Internal Service Quality, Service Quality Models, Hospitals, Facilities Management

Executive summary

Measures of service quality have become a widely used standard of business performance. Especially in marketing literature service quality is extensively researched. However, the studies are mainly focussed on external customers instead of on the internal customer. Nevertheless the internal service quality is important to deliver good external service quality. This study contributes to literature on internal customers specified to a hospital context. The relating research objective of this study is: *To develop and test a longitudinal service quality assessment model to measure internal perceived service quality of Isala facilitair's services by analysing service quality models and dimensions to assess internal service quality by customers and end-users, and instruments to collect feedback.* To answer this question a literature study and a case study with a survey and two in-depth interviews were conducted. The case study is conducted in Isala klinieken with Isala facilitair as case department.

According to literature, end-users perceive internal service quality based on the perceived internal service and the expected internal service. It is the extent of the discrepancy between customers' expectations or desires and their perceptions. The perceived internal service is the service that customers actually experience. The expected service is the desired service what the customer hopes for (a blend of what the customer believes can be offered and should be offered). The dimensions end-users use and customers in a hospital context after review by several FM managers in a hospital, are: Reliability (2) Responsiveness (3) Empathy (caring, individualized attention, understanding each other needs), (4) Tangibles (5) Costs (6) Competence (7) Communication, (8) Appearance of department's physical facilities, equipment and personnel, and (9) Accessibility.

For the case study three questionnaires were spread on end-user level to assess all services of Isala Facilitair based on the internal service quality dimensions found in literature and in order to gain a high response rate. These questionnaires, one for Services, one for Procurement and one for Technique and Accommodation, covered a total of 102 variables. The response rate was 29,4% with an amount of 1.425 respondents. At tactical level 2 in-depth interviews were held with two RVE managers, one RVE manager Intensive Care and Emergency Care and one RVE manager Gynecology and Obstetrics.

The results of this research indicate that end-users perceive internal service quality of Isala Facilitair based on 23 internal service quality dimensions. The assessment of the internal service quality of Services is based on nine dimensions: cleaning; bed conditioning; reception & telephony; service bureau; staff restaurant interaction quality; staff restaurant physical and outcome quality; catering and meeting rooms. For Services cleaning, meeting rooms and service bureau have the most influence on the overall internal service quality of Isala Facilitair. The assessment of the internal service quality of Logistics is based on six internal service quality dimensions: printers & waste; reprographic center; linen services interaction quality; linen services outcome quality; fine distribution; mail and hospital porters. For Logistics printers & waste, fine distribution and hospital porters have the most influence on the overall internal service quality of Isala Facilitair. The assessment of the internal service quality of Procurement is based on three internal service quality dimensions: procurement; orderdesk and orders. The assessment of the internal service quality of Technique and accommodation is based on six internal service quality dimensions: security; safety;

caretakers & technicians; maintenance condition and appearance; accessibility Isala klinieken and light at the workplace. For Technique and Accommodation, maintenance condition and appearance of the building, caretakers & technicians and safety have the most influence on the overall internal service quality of Isala Facilitair. Most dimensions are based on service level (i.e. security, cleaning, meeting rooms etc.). For linen services and staff restaurant a distinction is made between interaction, outcome quality and/or physical environment quality.

A questionnaire based on the 23 internal service quality dimensions will provide a valuable measurement tool for Isala Facilitair in measuring the internal service quality from an end-user perspective to make internal service quality improvements. With the measurement tool specific areas of Isala Facilitair that are in need of attention can be identified.

The dimensions on operational level might also be applicable at tactical level, however some internal service quality dimensions on tactical level should be added like 'providing management information'. Through measuring the perceived and expected internal service quality of these dimensions the internal service quality of Isala Facilitair can be measured.

From the baseline assessment certain areas for improvement arise. Services in which the expectations are significantly higher than perceived with a gap of one or higher on a scale of one till seven, are: cleaning, maintenance condition and appearance, accessibility Isala klinieken, linen services outcome quality and fine distribution. The services with a large gap and which are also an important predictor of the overall ISQ of IF should be improved first. These dimensions are: maintenance condition and appearance, cleaning and fine distribution.

Preface

This present report concerns a study conducted at Isala klinieken, a top clinical hospital in Zwolle (NL). The research is part of my master Management, Economics and Consumer studies (MME) with a specialization in Facility Management (FM) at the Wageningen University and forms my last phase to successfully complete the master MME.

The research focuses on the quality of FM services in hospitals. Within the research a quality measurement model will be developed from the internal customers perspective to measure the perceived internal service quality (of internal end-users and customers) on operational and tactical level of FM services in hospitals. The results and recommendations of the research will help Isala Facilitair (FM department of Isala klinieken) to improve their internal service quality in the long-run.

This research could not have been realized without the help of some people. Therefore I would like to express my gratitude to Isala klinieken and Isala Faciltair for the provision of the graduation project. Hereby I would like to especially thank Heert Prinsen, who introduced me to the organisation and Caroline Brandes for their help, advice and resources they provided me through the research period.

Another thank you goes out to my supervisor from Wageningen University, drs. Herman Kok for his help, advice and especially his quick response to my questions so I could always continue with the research. Furthermore I would like to thank dr. Mark Mobach, from the Wageningen University, for his help and feedback.

Finally, I also want to thank all FM managers, RVE managers and employees who were willingly to invest time in this research by participating in the interviews and questionnaires. Without their input it would not be possible to conduct this research.

At last I would like to thank my family and friends for their encouragement and support during the research project.

Zwolle, February 2013

Moniek Dekker

Table of contents

1. Introduction

The general focus of this present study concerns the internal service quality of Facility Management (FM) services in hospitals. Here, FM is defined as the 'integration of processes within an organization to maintain and develop the agreed services which support and improve the effectiveness of its primary activities' (CEN, 2006). Within this scope of FM several services can be included, among others: accommodation (e.g. design, maintenance); workplace (e.g. ergonomics, furniture, signage, decorations); technical infrastructure (e.g. climate, lighting); cleaning; health, safety and security (e.g. access control, fire safety); hospitality (e.g. catering, meetings, reception); ICT (e.g. data and telephone networks) and logistics. Besides this general focus there will be zoomed in to one particular FM department in a Dutch Hospital: Isala klinieken. In order to clarify the research context more information is given on the background of the case company Isala klinieken and the case department Isala Facilitair.

1.1 Background information

This paragraph starts with an introduction on the project context company, followed by the case department and afterwards the internal customers and service providers are introduced.

1.1.1 Isala klinieken

The case study 'Isala klinieken' is a top clinical hospital located in Zwolle (NL) founded in 1998 by a merger between the Sophia Hospital and the Weezenlanden Hospital. Isala klinieken obtains several locations including two hospital locations Sophia and Weezenlanden, two outpatients clinics, two laboratories and one deaconesses house. With 5.418 employees and 994 beds available it is the largest top clinical hospital in the Netherlands (Isala klinieken, n.d.). Each year, Isala klinieken takes care of more than 550.000 outpatient visits, 47.000 clinical admissions and 51.000 day treatments. A top clinical hospital can be viewed as a high cure hospital, offering highly specialized care (such as cardiac surgery, neurosurgery, IVF, etc.) which are relatively expensive and requires specialized equipment (STZ, n.d.). This is in line with what Isala klinieken offer; general hospital and trauma care for Zwolle and surrounding areas and clinical care with a number of highly specialized functions for the population between the academic medical centers of Groningen, Utrecht and Nijmegen (Isala jaardocument, 2011). Herein, *quality*, *attention* and a *personal relationship* with the patient are central (Isala klinieken, n.d.). The mission of Isala klinieken is stated: *"The Isala clinics are committed to the optimal recovery, maintain and enhance the quality of life of the people entrusted to her care".* They want to be meaningful to people at a crucial moment in their lives. As a professional service provider they deploy themselves maximally to deliver the best service tailored to the needs of the customer (Def. jaarplan 2012-2013). Here *openness*, *transparency* and with *heart & soul* are key aspects (Def. jaarplan 2012-2013). The *cooperation*, *quality* and *people-oriented service* are paramount (Def. jaarplan 2012-2013).

1.1.2 Isala Facilitair

This research focuses on department, Isala Facilitair (IF) which is the FM department of Isala klinieken. IF provides tailored, differentiated services and is, broadly speaking, responsible for:

Logistics:

- Hospital porters (Brancardiers)
- Logistics of goods and services
- Fine distribution
- Furniture
- Linen services (laundry, uniforms etc.)
- Mail and reprographics facilities
- Waste disposal

Technique and Accommodation:

- Building and installation engineering
- Emergency services
- Energy management
- Environment management
- Housing and building management
- Security

Services:

- Horeca and retail (restaurants for visitors and staff, meal services)
- Cleaning
- Conference service
- Parking
- Service office, telephone and reception service

Procurement:

- Assortment management
- Contract management
- Ordering
- Procurement policy
- Supply management

IF strives for *optimal customer loyalty* and a *high customer satisfaction* (Strategie Isala Facilitair 2011-2014). The strategy of IF in 2011-2014 is stated:

IF considers it her challenge to offer optimal, integrated services to patients, visitors and staff of the Isala klinieken in the field of hospitality experience, safety, materials, resources and food (Strategie Isala Facilitair 2011-2014).

1.1.3 The internal customer, external customer and service providers

For FM it is important to define who is and may be the customer since FM can have different customers per subproces (Lennerts et al., 2005). In ISO 9000 the customer is defined as "organization or person that receives a product". Therefore, for a hospital the customer is the patient, receiving healthcare. However, for IF as an internal service provider and according to the European Standard EN 15221-1 (CEN, 2006) customers are more divers. The customers of IF can be considered patients, visitors and staff. The internal customers are the employees who receive services from an internal supplier as a necessary input to perform their own jobs (Lovelock and Wirtz, 2004) therefore in this study the patients and visitors will be referred to as the external customers and the employees are referred to as internal customers. Within IF there is also a distinction made, based on the NEN-EN 15221-1 (2006), between three types of customers according to three organizational levels: client (strategic level), customers (tactical level) and end-users (operational level). The client is the portfolio holder of facility services in the management team and the three operational directors. The customers are the 16 RVE managers (purchasers) who are responsible for their budget and are charged a transfer price for the services of IF (Appendix I). End-users (operational) include staff like doctors, nurses and office employees who directly uses services or products from IF (internal), the patients and visitors (external).

The FM service providers are the departments: Logistics, Procurement, Services and Technique & Accommo-dation. The service provision in these areas are supplied in-house and partial outsourced.

1.2 Conceptual research design

In the conceptual research design the purpose and scope of the research are outlined. First information on the problem analysis and theoretical relevance will be described, subsequently the research objective and questions are formulated and finally the research framework will be presented.

1.2.1 Problem analysis

Isala Facilitair (IF) is currently changing from a traditional self-performing organisation to a demand-supply organization (Dutch: regieorganisatie). A demand-supply organization can be typed as an organization where possible services are outsourced, but the management of demand and supply itself is still in house. The emphasis is on steering of supply and demand to deliver added value to the customer. Furthermore on establishing a relationship with the customer where the expectations can be managed properly and the organization is aware of the needs of the customer. More FM services are being outsourced in accordance with the transition to a demand-supply organization of IF. Currently, IF is unaware of the perceived quality of their FM-services and the related customer satisfaction from internal customers and end-users. IF determines the desired service quality for its users implicitly based on experience and complaints. Hereby, IF is not sufficiently aware of the perceived service quality. Besides IF in unaware of the quality of the services which internal end-users (employees) expect to serve the external end-users (patients) best. Since the transition to a demand-supply organization requires a customer focus and possibilities to make intelligent decisions, IF lacks feedback regarding their services quality from services retained in-house and from outsourced services from a customer perspective. Based on the feedback from customers, decisions can be made regarding suitable service levels. Furthermore, with the feedback suppliers can be assessed on their delivered internal service quality, to make sure a sufficient internal service quality is delivered. Therefore, a quality measurement model needs to be developed from the internal customer's perspective to measure the perceived service quality (of internal end-users and customers) on operational and tactical level in hospitals. In order to respond to the changing demand of internal end-users (operational level) and customers (tactical level) the service quality needs to be measured at different points in time.

For the model several conditions are composed. One of the conditions of the longitudinal internal service quality model is: the output of the model developed for IF should support management in the tactical and strategic decision making (e.g. outsourcing decisions, innovations and SLA's). Secondly, the model should be manageable (i.e. easy to use); to be able to use it more often. Thirdly, it should measure the *perceived internal service quality and* the *desired service quality*. Lastly, IF would like to perform an internal measurement of the perceived internal service quality with regard to quality of facility services within the current situation. The current situation will form the baseline assessment (Dutch: nulmeting). With a baseline assessment of the internal service quality, awareness will be created to the different managers about the current perceived quality of their services. It also provides a view on areas for improvement.

1.2.2 Theoretical relevance

Measures of service quality have become a widely used standard of business performance (Hurley and Estelami, 1998). Especially in marketing literature service quality is extensively researched

(Anderson et al. 1994; Bolton and Drew, 1991; Spreng et al. 1996). However, the studies are mainly focussed on external customers. Although better service to internal customers should result in better service to external customers (Lings and Brooks, 1998) literature on internal customer service quality is less present. Nevertheless the internal service quality is important to deliver good external service quality. Specific research to the application of service quality model within FM is limited. This is in accordance with research from Seth et al. (2005), in which several models of service quality have been reviewed and concluded that there is not a well-accepted conceptual definition and model of service quality nor there is a definition of how to measure service quality.

Furthermore, some scholars have researched the external service quality in hospitals (Vandamme and Leunis, 1992; Sower et al., 2001), however, research on internal service quality within a *hospital context* like Reynoso and Moores (1995) remains scarce. Therefore, this research aims to provide an internal service quality measurement model for a hospital setting and more specifically for IF. The study explores how internal customers integrate their perceptions and desired service quality to assess service quality of FM services.

As the quality service to internal end-users converts to service quality to external end-users (Azzolini and Shillaber, 1993), a good internal service quality can positively impact the external service quality which is important to maintain end-users and customers (patients, visitors, staff members and managers). Therefore to maintain external end-users, knowledge on internal perceived service quality with regard to internal FM-services is important to elucidate for IF, in order to fulfill the demand of the employees and support the primary activities. Furthermore, according to Zeithaml et al. (1990) there is a positive and significant relationship between customer's perceptions of service quality and their willingness to recommend the company. Therefore a good internal service quality can increase the amount of external customers and end-users, which could increase the company's revenue.

In order to gain an overall picture of the service quality of the FM services (Logistics, Procurement, Services, and Technique and Accommodation) in hospitals within the timeframe of the research, the perspective of service quality from the customers and end-users was taken. Due to time constraints the strategic level, also known as the 'client' is not part of this study. The scope of this study is shown in the outline of Figure 1.1, using CEN's model (European Committee for Standardisation), the main focus will be on the demand side, on customer and end-user level.

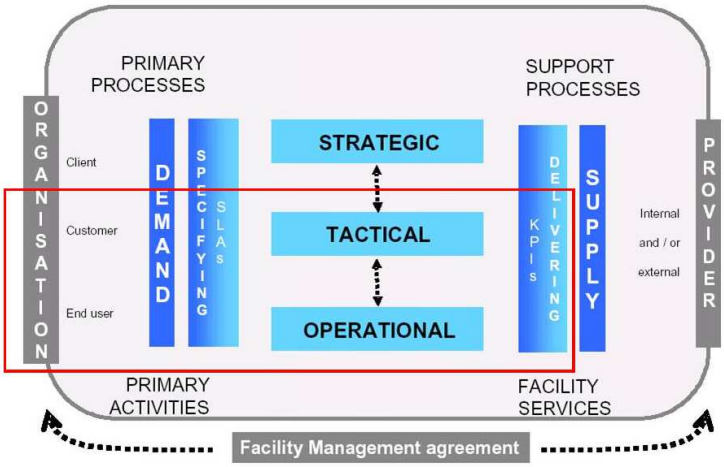


Figure 1.1 FM model (NEN-EN 15221-1, 2006)

1.2.3 Research objective & Questions

The goal of the research is to develop a longitudinal quality assessment model tool which provides repeatedly explicit feedback from the internal customers and end-users of IF services, for the management team on the quality of services. The measurement results should clarify which services

of IF to adjust in order to meet the changing wants and needs of customers and end-users. The results may also be used as input for outsourcing decisions, innovations and enlighten service level agreements. Second goal of this study is testing the model by assessing the current internal customer and end-user perceived- and desired service quality. Therefore, the research objective related to the problem analysis is:

To develop and test a longitudinal service quality assessment model to measure internal perceived service quality of IF's services by analysing service quality models and dimensions to assess internal service quality by customers and end-users, and instruments to collect feedback.

The research objective is divided in the following sub-goals:

- Design a manageable model which can be used to measure internal perceived and desired service quality of IF services;
- Perform a baseline assessment of the internal perceived and desired service quality in the current situation.

Based on the results of the study recommendations will be given, e.g. key performance indicators to assess FM suppliers (Services, Procurement, Logistics and, Technique and Accommodation). Key performance indicators enable the organisation's effectiveness, in meeting its objectives, to be measured objectively (Atkin and Brooks, 2010). Furthermore recommendations will be provided with respect to areas for improvement related to FM-services quality, to the management team. From this research objective the main research question is derived:

How should the internal service quality of IF services be measured in the long-run, from a customer and end-user perspective?

To answer the general research question, the following specific research questions have been formulated.

From literature research:

1. What is internal service quality and customer satisfaction?
2. How can (internal) customer expectations and perceived service quality be identified and measured?
3. What are the relevant internal service-quality dimensions for a hospital to asses perceived facility service quality on an operational and tactical level?
4. How should the internal service quality of FM services in hospitals be measured in the long-run, from a customer and end-user perspective?

From empirical research:

5. How do internal customers and end-users perceive the service quality of FM services in hospitals? (baseline assessment)
    a. What are the expectations (is the desired service quality) of internal end-users (operational staff) and customers (RVE managers) on Logistics, Services and Technique & Accommodation?
    b. What is the perceived service for logistics, services and technique & maintenance according to end-users and customers?
    c. What service quality dimensions are important for customers and end-users?

1.2.4 Definition of concepts

To be clear on the usage of different terms and to improve the readability of the report, the following definitions used in the report are described. It also ensures that the right terminology is used during the report. Some terms like customers, end-users and consumers are used interchangeably in literature. In Table 2.1 our definitions of the terms can be found.

Table 2.1 Concept definitions

Term	Definition	Source
Client	Organization that specifies needs and procures estate-related and facility services by means of a facilities management agreement. (board of directors)	Atkin and Brooks (2010)
Critical success factor (CSF)	Attributes of a service that determine whether or not its objectives and priorities have been met.	Atkin and Brooks (2010)
Customer	Organisational unit that specifies and receives estate-related and facility services within the conditions of a facilities management agreement.	Atkin and Brooks (2010)
Customer satisfaction	The customer's evaluation of a service in terms of whether that service has met the customer's needs and expectations.	Wilson et al. (2008)
Desired service	What the customer hopes for (more or less 'a blend of what the customer believes 'can be' and 'should be')	Grotenhuis et al. (2007)
End-user -Internal end-users -External end-users	Person who uses or consumes the product/service. Employees Patients and visitors	Parasuraman and Grewal (2000)
Internal services	Services provided by distinctive organizational units or the people working in these departments to other units or employees within the organization.	Stauss (1995)
Internal service encounter	The dyadic interaction between a customer and service provider.	Gremler et al. (1994)
Key Performance Indicators (KPI)	Key performance indicators enable an organisation's effectiveness, in meeting its objectives, to be measured objectively. Usually two or more KPI's will be linked to a critical success factor.	Atkin and Brooks (2010)
Performance measurement	The process of quantifying the efficiency and effectiveness of an action.	Amaratunga and Baldry (2002)
Perceived Service Quality	The customer's assessment of the overall excellence or superiority of the service	(Zeithaml, 1988)
(Longitudinal) Perceived Service quality measurement model	A model which tries to capture and define "Internal Service Quality" at different points in time from a customer perspective.	
Service Level Agreement (Internal and external)	Deals with how the service specifications shall be translated into actions that achieve the required result and will include the means for dealing with evaluation of performance, incentives and penalties.	Atkin and Brooks (2010)
Service quality	A function of the difference between expectations of customers on the service and perceptions of the performance of the service provider.	Parasuraman et al. (1985)

1.2.5 Research Framework

The research is schematic presented in a research framework. This research framework is a schematic presentation of the research objective and includes the steps that need to be taken in order to reach the objective (Verschuren and Doorewaard, 2010). The corresponding research framework is depicted in Figure 1.2 at the following page. The research framework includes the different phases of the research and their interconnections (Verschuren and Doorewaard, 2010).

1.3 Research strategy

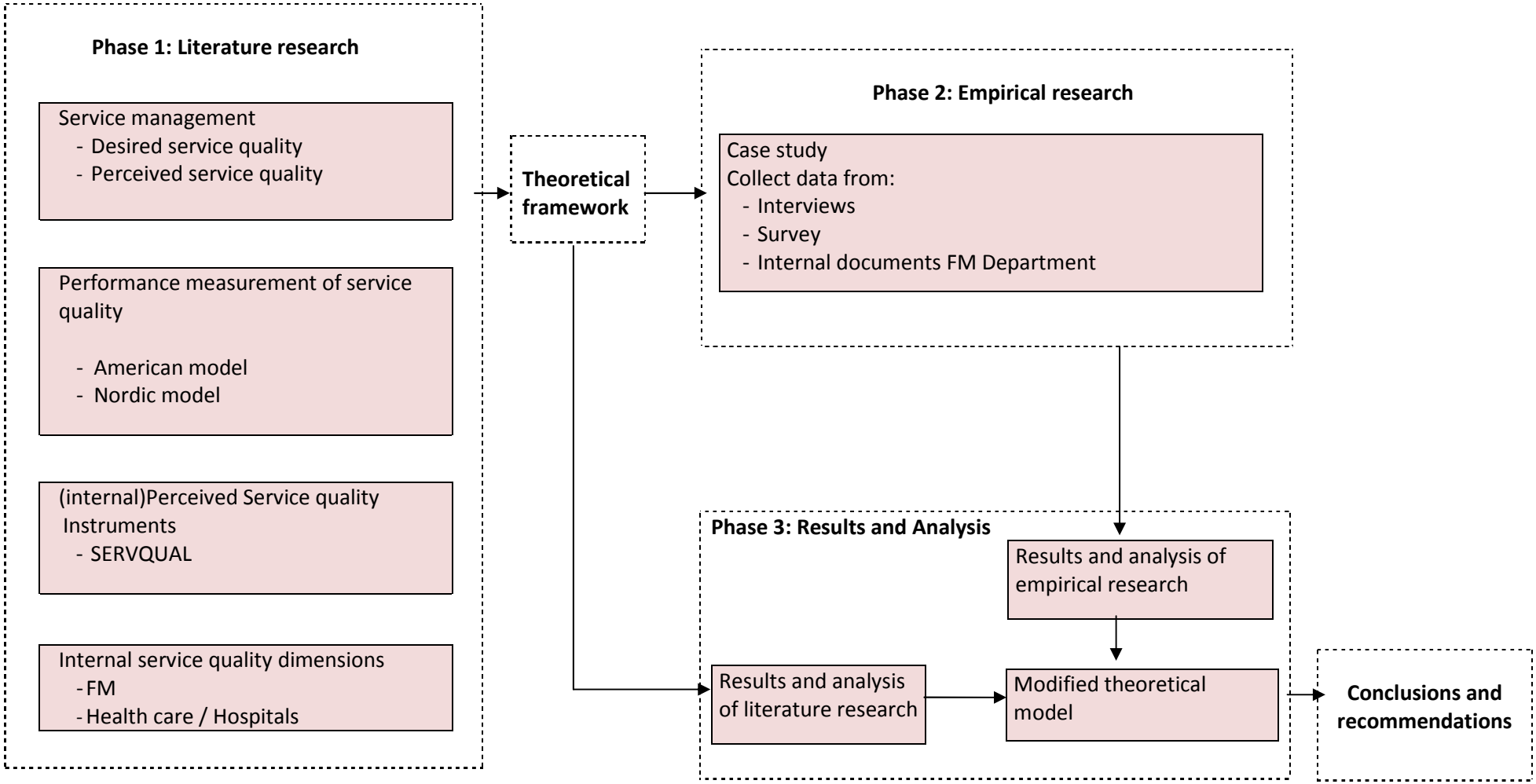
The research strategy defines how the research material will be gathered in order to answer the specific research questions. Verschuren and Doorewaard (2010) distinguish five research strategies, i.e.: survey, experiment, case study, grounded theory and desk research. This research consists of two phases. The first phase of the research consist of desk research, also referred to as literature study, followed by the second phase, the empirical research which will consist of a case study with two in-depth interviews and an internal survey (i.e. questionnaires). Since the research opts for reaching a large part of customers it can therefore rather be called a breadth research than a depth research.

The literature study consist of desk research, where among others scientific articles and scientific books will be utilized to answer the first specific research questions and to develop a theoretical framework. The theoretical framework from the literature study will form the input for the empirical study. In the case study, the researcher tries to gain a profound and full insight into one or several objects or processes that are confined in time and space (Verschuren and Doorewaard, 2010). With a case study more in depth information can be obtained. Therefore, a case study will be conducted in the health sector to identify and analyze internal service quality and relating key performance indicators (Table 2.1) for FM services in hospitals. To gain an overall picture of the research object (Verschuren and Doorewaard, 2010) the case study will contain a single case (single case study). Hereby, the case can be thoroughly examined to obtain in depth knowledge (Verschuren and Doorewaard, 2010). To achieve depth, the 'triangulation of sources' is used by working with several sources (Verschuren and Doorewaard, 2010). The two types of sources are customers and end-users, more information about customers and end-users can be found in chapter 5 Data collection. Additionally also different methods will be used, like (qualitative) interviews and questionnaires.

1.4 Outline research

The literature review will address three areas related to create awareness of the quality of the service which internal end-users (employees) expect or need. The first section will address research related to service quality and customer satisfaction and the underlying relationships. The second section will discuss the several dimensions used by customers and end-users to assess service quality. Finally, the third section will focus on the several methods and instruments used to measure service quality. In chapter 8 the methodology used for the empirical study will be discussed. Chapter 9 and 10 continuous with the results of the empirical study.

Figure 1.2 Research framework



2. Internal service quality

This chapter will give a brief description of the general concepts of the research including: service quality (internal and external), perceptions, expectations and customer satisfaction. Therefore in this chapter an answer will be given to the first specific research question: What is internal service quality and customer satisfaction? The terms 'quality' and 'satisfaction' are sometimes used interchangeable in literature (Iacobucci et al., 1995). Although the terms service quality (SQ) and customer satisfaction are related they are not equivalent (Cronin and Taylor, 1992). Therefore, in this study we make a clear distinction. The difference and relationship between both terms will be discussed in the following paragraphs to answer this first research question. Finally, the service characteristics will be discussed and how these internal service characteristics influence the internal service quality (ISQ).

2.1 Defining Internal Service Quality

Internal services are defined as services provided by organizational units or the people working in these departments, to other units or employees within the organization (Stauss, 1995). Internal customers (i.e. employees) use services from other departments to satisfy the needs they have in the course of carrying out their job responsibilities (Kang et al., 2002). Delivering qualitative internal services is critical to employee satisfaction since improvements in ISQ are expected to produce improved external SQ (Hart, 1995; Heskett and Schlesinger, 1994; Kang et al. 2002). Satisfied employees are again a critical prerequisite to the satisfaction of external customers (Kang et al. 2002). In this research the focus will be on FM services. FM covers a wide range of facility services; a generic scope of FM services is shown in Attachment III.

2.1.1 Perspectives of service quality

To be able to measure ISQ, the definition of ISQ used should be clarified. In literature *the term service quality* is defined in various ways, from different perspectives. For instance, value-based definitions define SQ in terms of value and price by considering the trade-off between performance and price, while user-based definitions are based on the presumption that quality lies in the eyes of the beholder and evens quality with maximum satisfaction (Lovelock and Writz, 2007). These two categories are also recognized by Ghobadian et al. (1994) as customer led and value led. Other categories are product led where SQ is defined as the units of goodness packed into a service and process or supply led in which quality is defined as 'conformance to requirements' (Ghobadian, 1994) definitions of quality. A customer and end-users perspective (note: user-based and customer led) ensures their needs and expectations are closely considered, which in the end is important to serve the external customers. This is confirmed by Ree (2006) stating that SQ should be obtained through the customer and by observations of the process. The SQ according to customers and end-users is subjective and thus varies per person. Like Ree (2006) states: 'quality of services is in the eye of the customer'.

2.1.2 Expectations

To better understand expectations as they pertain to customer assessment of SQ (Zeithaml, 1993) this concept is further explained. The SQ definitions from an external customer's perspective are divers. Christopher et al. (1993) defined SQ as the ability of the organisation to meet or exceed customer expectations. Zeithaml et al. (1990) have defined SQ as "the extent of the discrepancy between customers' expectations or desires and their perceptions". Parasuraman et al. (1985) and Lovelock and Wirtz (2007) define SQ, perceived by customers, as a comparison of expectations of customers on the service and perceptions of the performance of the service provider.

Also for an internal customer approach, several scholars (Chung, 1993; Koska, 1992; Ludeman, 1992; Plymire, 1990) have addressed the need to determine internal customer's needs and expectations (Reynoso and Moores, 1995). The expectations or expected service is the service that meets the expectations of customers (Grotenhuis et al., 2007). In *SQ literature* expectations are referred to as desires or wants of customers, i.e. what customers feel a service provider should offer (Parasuraman et al., 1988). In *services marketing* literature assessments of SQ results from a comparison of desired service and perceived service (Zeithaml et al., 1993). Within *customer satisfaction literature* other definitions are used, what customers feel a service provider would offer (Parasuraman et al., 1988) and a comparison between predicted service and perceived service (Zeithaml et al., 1993). Despite the differences in literate, consensus exist to expectations which serve as standards which subsequent perceived experiences are compared to (Zeithaml, 1993). Because customers compare their perceptions of performance with these standards (i.e. expectations) when evaluating SQ, knowledge on these expectations is necessary (Wilson et al., 2008).

Within FM the primary function is to handle and manage support services to meet the needs of the organisation, its core operation and employees (Chotipanich, 2004). Therefore the definition used in SQ literature which describes SQ in terms of desires or wants of customers, is most appropriate to assess SQ of FM services.

Desires or wants of customers

This distinction can be further explained by distinguishing between expectations of adequate services and desired services. Here, the *desired service* is the service what the customer hopes for (a blend of what the customer believes can be offered and should be offered) and the *adequate service* is the minimum level of service the customer will accept to be satisfied (Grotenhuis et al., 2007). The adequate level can be perceived as the level of quality the customer *needs* to perform.

2.1.3 Perceived service quality

The *perceived SQ* is further defined as the customer's assessment of the overall excellence or superiority of the service (Zeithaml, 1988). It is the service that people actually experience (Grotenhuis et al., 2007). Customers perceive SQ based on *multiple dimensions* relevant to the context (Wilson et al., 2008) like reliability, responsiveness and empathy (Parasuraman et al., 1985). When these aspects are positive this will also have a positive effect on the perceived SQ. According to several definitions of SQ expectations and the perceived service are important factors for service SQ. This is supported by Seth et al. (2005) who state that the majority of SQ models and definitions support the view of evaluating SQ by comparing SQ expectations with the experienced perceptions of SQ. For this research it is assumed that the definition for perceived SQ also accounts for internal perceived SQ. This is partly supported by a study of Gremler et al. (1993) who found that internal

customers are similar to external customers in that the same general events and behaviours of service providers are associated with satisfaction or dissatisfaction in *service encounters* also called 'moments of truth' (e.g. a period of time during which customers interact directly with a service provider (Lovelock and Wirtz, 2004)) and by Zeithaml et al. (1990) who state that with appropriate adaptation the use of an external instrument for measuring perceived SQ to external customers can also be used for internal customers. Therefore we define *ISQ* (likewise perceived internal service quality) as the *discrepancy* between internal service expectations and the internal perceived service. The perceived ISQ lies along a continuum with 'unacceptable quality' at one end and 'ideal quality' at the other end (Ghobadian et al., 1993). This means that if the perceived ISQ is equal to expected ISQ the SQ is considered satisfactory (1). When the perceived ISQ is higher than the expected ISQ, the ISQ is ideal (2) however, if the perceived ISQ is considered lower than the expected ISQ the quality of services is unacceptable (3) (Ghobadian et al., 1993).

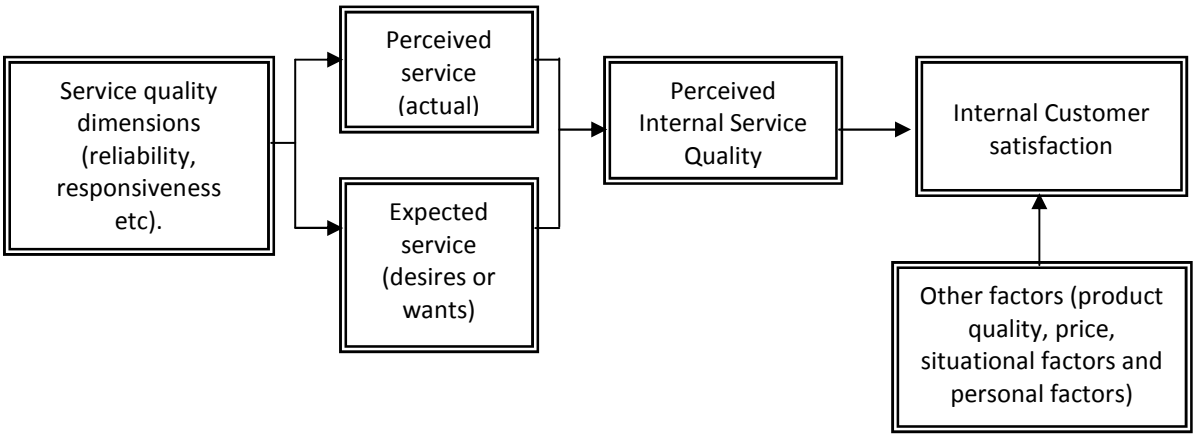
Quality of research on perceived services provides the operating companies with knowledge on the impact their decisions have on their customers, while a study on desired quality gives more in-depth information about their customers and what they want from the service (dell'Olio et al., 2011). By studying both aspects the gaps between perceived and desired quality will be identified. Besides, customers change their expectations and perceptions over time (Boulding et al., 1993) which makes it necessary to study both aspects.

2.2 Relation between Service Quality and Customer satisfaction

Sometimes the terms service quality and customer satisfaction are used interchangeably in literature as in practice (Iacobucci et al., 1995). Therefore first the distinction and relation between both concepts are clarified. In literature, the term customer satisfaction is generally viewed as a broader concept than SQ which focuses on *service dimensions* (Wilson et al., 2008). Customer satisfaction is influenced by perceptions of SQ but also by product quality, price, situational factors (e.g. weather conditions) and personal factors (e.g. emotional state) (Wilson et al., 2008). Customer satisfaction is "a psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's *prior feeling* about the consumption experience" (Oliver, 1981). According to several scholars (Cardozo, 1965; Oliver, 1980; Oshavsky and Miler, 1972; Olson and Dover, 1976) customer satisfaction or dissatisfaction is a function of the *disconfirmation* arising from *discrepancies* between prior expectations and actual performance (Bolton and Drew, 1991) which we defined as SQ. Thus the expectations and perceptions of performance levels of services influence customer satisfaction (Bolton and Drew, 1991). When a satisfactory quality (1) or ideal quality (2) is attained each time the service is delivered, the customers will be satisfied provided that all other factors (e.g. product quality, price, situational and personal factors) remain equal. Contrary to when an unacceptable quality (3) is attained, then customers will be dissatisfied provided that all other factors remain equal. For instance, when an employee reports a malfunction to the service desk and the employee expects that it will be resolved within three days, the employee will be satisfied when within three days he or she notices it is resolved. However he or she will be dissatisfied if it is resolved after three days. Other scholars (Cronin and Taylor, 1992; Gotlieb et al., 1994; Spreng and Mackoy, 1996) confirm that there is a causal relationship between perceived SQ and customer satisfaction (Hurley and Estelami, 1998). This causal relationship is assumed to account also for internal customer satisfaction and perceived ISQ.

Thus, when a positive discrepancy between the perceived services and the expectations increases in a positive way (i.e. perceived SQ is perceived higher than expected), the ISQ will also increase, which likewise influences the internal customer satisfaction. Hence, the ISQ for customers and end-users depends on the nature of the discrepancy (Parasuraman et al., 1985), the discrepancy can work positive and negative to the ISQ and eventually to the internal customer satisfaction. The causal relationships between the core concepts of the study are shown in a generic conceptual model in Figure 2.1.

Figure 2.1 Conceptual model



3. Internal customers and service characteristics

The health care sector, hospitals and FM providers in particular, are concerned with the provision of services rather than physical goods. Therefore in this chapter we will deepen into the characteristics of internal services and the internal customer. To *understand how customers can assess and measure internal service quality (ISQ)* it is important to identify the nature of services, service characteristics which account for internal service encounters. Therefore, when referring to services in the following paragraphs only internal services are meant and not external services. Before describing the service characteristics, we first define the internal customer who can assess the service quality (SQ) of internal services.

3.1 Internal customers (active and non-active)

The internal customers are the employees who receive services from an internal supplier as a necessary input to perform their own jobs (Lovelock and Wirtz, 2004). The internal customers can differ per service type, for instance the customers for procurement can be different than customers for a catering provider. For the procurement department the customer is the person or department for whom the material or service is purchased (Young and Varble, 1997), for the catering provider the customer can be typed as the employees eating in the staff-restaurant and/or using vending machines. Internal customers can be characterized as *non-active customers,* customers who can potentially demand the internal services (e.g. managers of a certain organizational level or from given business units). A large group of internal customers can be characterized as non-active customers (customers who can but do not recently make use of the services), who turn into *active customers* when they are confronted with a problem (Stauss, 1995). For instance, when an employee notices a malfunction and reports the malfunction although he hasn't reported a malfunction recently, then the customer is changing from a non-active to an active customer. Active customers can be asked about their perceived and expected ISQ, non-active customers however can only be asked about their expected ISQ.

3.2 Service characteristics (nature of services)

Establishing an appropriate (perceived) ISQ model does not guarantee that common practices of customer-oriented quality management can be employed without problems (Stauss, 1995). There are some prerequisites, for instance it is necessary that customers are aware of suppliers and offerings to determine expectations of customers, and a high amount of customer evidence (Stauss, 1995) is needed. Only when customers are familiar with the service, they are able to make use of it and can judge the performance. These prerequisites are related to the fact that the quality of services differs from product quality due to the different characteristics of services. For example, services are intangible while products are tangible. Other characteristics of service, besides intangibility, are: inseparability of production and consumption; perishability and heterogeneity (Parasuraman et al., 1985). SQ is difficult to define objectively (Ree, 2006), to asses and monitor, due to these characteristics.

Intangibility

Most services are intangible as they have usually little or no tangible evidence to show once a service is performed (Lewis and Entwistle, 1990) e.g. security in a building. The service intangible aspects, e.g. empathy and courtesy, are related to the encounter between customer and the service provider (Mels et al., 1997). In the *internal service encounter* stage the customer will usually get contact with the service provider. This service encounter can take various forms: face-to-face, over the telephone, written communication or electronic, and automatic means (Young and Varble, 1997). These internal encounters can include relationships between customer-contact staff and the backroom staff, managers and the customer-contact staff and, managers and the back-room staff (Lewis and Entwistle, 1990). The encounter gives the customer the opportunity to observe the service providers interpersonal skills (e.g. empathy, courtesy and responsiveness) and technical skills (e.g. technical knowledge of the service and ability to perform the service the right way the first time) (Sulek and Hensley, 2010). As the services are intangible, the customer often looks for cues of quality. When the service contains a high-contact service, customers receive more cues to evaluate SQ. Therefore, the extent to which the customer experiences the SQ depends on the degree of contact with the service in the *service encounter* stage. Although service are mostly intangible, they also do contain some tangible aspects during the delivery process. Tangible aspects can be speed of response or problems solved in time limits, these quality aspects can be objectively measured. Tangibles also include the servicescape. The servicescape refers to the built environment (i.e., the manmade, physical surroundings) (Bitner, 1992). The servicescape includes the physical facilities of a service company (Reimer and Kuehn, 2004) but can also include equipment, personnel, communication material (Zeithaml et al., 1990), temperature, noise and odour (Wakefield and Blodgett, 1999). Mainly technique and housing services contains many tangible characteristics.

Inseparability

For services, the production and consumption are inseparable. This means that services are simultaneously produced and consumed (Berry, 1980) which gives the service a high visibility in the conversion of production to consumption. Mistakes or quality shortfalls (Ghobadian et al., 1994) are directly noticed by customers and end-users. The customer is not only often present when the service is provided but may even be involved in the service performance (Lewis and Entwistle, 1990). For FM, usually the FM provider creates or performs the service at the same time as the full or partial consumption of the service takes place, for instance catering providers in staff restaurants or cleaning activities which often take place in day time when customers use sanitary facilities. Therefore the customer or end-user *evaluates* the service also at the same time of the consumption of the service. This places greater responsibility on service organizations to deliver what they promise right the first time (Ghobadian, 1994) to ensure SQ. Besides, the involvement of the customer in the delivery process introduces an additional process factor, the customer, over which the management has little or no direct control (Ghobadian, 1994). The behaviour of one group of customers can influence other customers' perception of SQ (Ghobadian, 1994). Poor behaviour of the group can have a negative influence on the overall ISQ perceived by other customers. This additional factor, the customer, should therefore be taken into account when evaluating SQ since it influences the ISQ but is out of the control of the service provider.

Heterogeneity

Services are frequently modified to meet various individual needs e.g. professional and financial advice (Lewis and Entwistle, 1990), they are different per occasion and thus cannot be reproduced exactly. It is often difficult to reproduce a service consistently (Ghobadian, 1994) for instance, a service desk cannot provide the exact same services to every client. Several factors can affect the extent of the heterogeneity of service provisions. *First,* delivery of service often involves some form of contact between the end-user and service provider (Ghobadian, 1994). The behaviour of the service provider influences the end-users perception of quality (Ghobadian, 1994). *Second,* service operations depend on end-users and customers to articulate their needs or provide information. The accuracy of the information and the ability of the service provider to interpret this information correctly has a significant influence on the customers perception of SQ (Ghobadian, 1994). *Third*, the priority and expectations of the end-user may vary each time they use the service or during the service delivery (Ghobadian, 1994). However the third factor is minimized for internal services as internal customers know what kind of service they can expect (Stauss, 1995) since they often repetitively make use of the internal services. As the customer knows what to expect, their expectations will be more constant. These three heterogeneity factors influences the way internal SQ is perceived and assessed. The variability of service per occasion and from end-user to customer makes quality assurance and control difficult (Ghobadian, 1994).

Perishability

Services are perishable and cannot be stored in one time period for consumption at a later date (Ghobadian, 1994) to meet fluctuations in demand e.g. legal and medical services (Lewis and Entwistle, 1990). For instance, when a security request is made for assistance e.g. aggression and running away patients in a hospital for tomorrow at a specific time, the service cannot be stored and used at another time. This means, every encounter is a moment of truth. Therefore, the service provider needs to get the service right the first time in order to deliver qualitative services.

The degree of the service characteristics depends on the type of service, therefore also the degree of 'evidence' customers have to judge the service varies per service. For instance customers using vending machines and postal services have less contact with suppliers than using appliance repair services. Therefore, it is appropriate to classify internal services (Stauss, 1995) when measuring SQ based on their similar characteristics and only measure perceived SQ of services with sufficient 'evidence' for customers. Furthermore, according to Gremler et al. (1993) the internal service departments need to apply measures of SQ to the internal service encounter to ensure that internal providers of services are providing satisfactory service to their internal customers. In the *service encounter* the service characteristics which customers can assess, come together. Besides, from a service provider point of view every service encounter provides an opportunity to improve the perception of services by internal customers. This makes the internal service encounter an important aspect when measuring ISQ.

3.3 Conclusion

The characteristics of internal services have implications for the service provider to deliver high SQ to the customer and for the (perceived) SQ measurement. As services cannot be measured total objectively due to the different characteristics (intangibility, inseparability, heterogeneity and perishability) it should be for a large extent measured subjectively through the customer judgement of SQ. However, the several characteristics make the measurement of SQ difficult not only for businesses but also for customers and end-users. The characteristics influence how end-users and employees acquire SQ information on which to base on their *expectations* and evidence for their *perceived SQ* evaluation. Therefore, when measuring the perceived SQ, the intangibility, inseparability, heterogeneity and perishability aspects need to be taken into consideration because it influences the perception of SQ, how active customers and end-users perceive and assess the services. When taking all characteristics into account, the ISQ of the services should be measured based from a customer perspective. Furthermore, quantitative research should be performed, as this minimizes the effects of delivering heterogeneous and inseparable services, in order to give a reliable view on the overall ISQ.

4. Dimensions of external and internal service quality

Research suggests that customers' judge quality based on multiple dimensions relevant to the context (Wilson et al., 2008). These quality dimensions can be described as the customer's evaluation criteria of the perceived performance (Hollis, 2006) of the service. The quality perceived by external customers can be captured in the form of SQ dimensions (Parasuraman et al., 1988; Sower et al., 2001) just like perceived SQ by internal customers and end-users can be captured in SQ dimensions (Reynoso and Moores, 1995; Young and Varble, 1997). These sets of dimensions or criteria are referred to as internal service quality (ISQ) dimensions. The ISQ dimensions are measured by a set of variables that represents each dimension appropriately. To ensure SQ the dimensions of quality should be determined (Ghobadian et al., 1994) which also accounts for ISQ. Therefore, in this chapter an answer will be given to the question: *What are the relevant internal service-quality dimensions for a hospital to asses perceived facility service quality on an operational and tactical level?*

To answer this second research question, two streams of SQ dimensions are identified, these will be explained in the first paragraph, subsequently SQ dimensions will be discussed at external organisational level which are also relevant for internal use, followed by external dimensions in health care and for hospitals as ISQ dimensions are limited, and more specifically ISQ dimensions in health care and hospitals at operational and tactical level.

4.1 Nordic versus American perspective

In literature two schools have developed in conceptualizations of SQ, namely the Nordic (1) and North American school (2). The Nordic perspective defines the dimensions of SQ in global terms as consisting of functional and technical quality (Brady and Cronin, 2001) and is based on Grönroos's (1982, 1984) two-dimensional model (Ali, Talib and Idris, 2009), see Figure 4.1. Whereas the North American perspective (2) is based on Parasuraman et al. (1988) five dimensional SERVQUAL model (Ali et al., 2009) which uses terms that describe service encounter characteristics (i.e. reliability, responsiveness, empathy, assurances and tangibles) (Brady and Cronin, 2001), see Figure 4.2. Both models define SQ as the discrepancy between expected and perceived service (Brady and Cronin, 2001) through two and five dimensions.

Fig. 4.2 The SERVQUAL Model (Parasuraman et al., 1988)

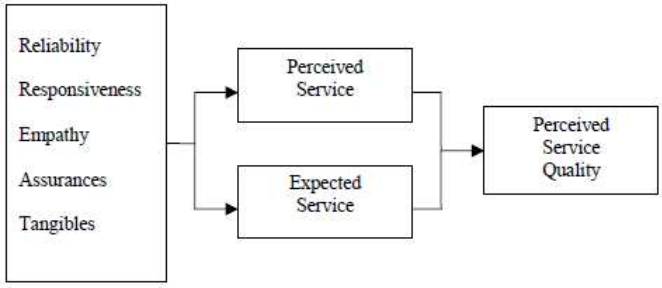
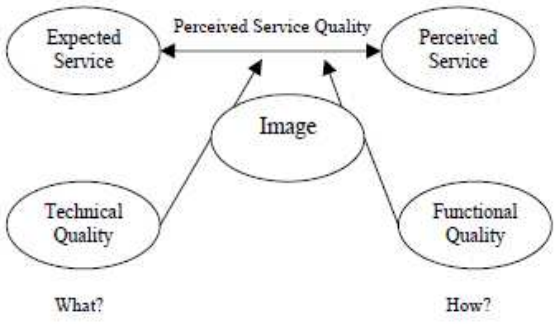


Fig. 4.1 The Nordic Model (Grönroos, 1984)



Despite the different dimensions both streams make a distinction between perception of services and expectations. Both streams served as the base for examining dimensions and measurements of various researchers which will be discussed in the subsequent paragraphs.

4.1.1 American school

Several researchers have identified SQ dimensions (Gilbert and Wong, 2003; Reimer and Kuehn, 2004; Dabholkar et al., 2000). However the dimensions of SQ are still a matter of debate and depend on the context (Liou and Tzeng, 2007) and on perceptions individual customers have towards service dimensions. Perhaps the most publicized are the dimensions proposed by Berry, Parasuraman and Zeithaml (Reynoso and Moores, 1995) of the American school. They originally identified ten service dimensions (Appendix II) and where later adapted to five dimensions: tangibles, assurance, reliability, responsiveness and empathy, as described below. Many scholars used the SERVQUAL dimensions as a theoretical framework in healthcare for external SQ (Babakus and Mangold, 1992; Bebko and Garg, 1995; Carman, 1990 and Clow et al., 1995). According to Zeithaml et al. (1990) the external SQ dimensions can also be used for ISQ as they state: 'SERVQUAL with appropriate adaptation can be used by departments and divisions within a company to ascertain the quality of service they provide to employees in other departments and divisions'. SERVQUAL is an instrument for measuring service quality (Zeithaml et al., 1990). The statement of Zeithaml et al. (1990) is further supported by Christopher and Les (1999) and Frost and Kumar (2000) who found that the five SERVQUAL dimensions (as mentioned above) do apply to internal service situations. Besides Babakus and Mangold (1992) found that the SERVQUAL instrument is a reliable and valid instrument in a hospital environment. The core dimensions of perceived and expected SQ according to Zeithaml et al. (1990) are presented below.

Tangibles

Tangibles include the physical evidence of the service: physical facilities; appearance of personnel; tools or equipment used to provide the service; physical representations of the service, such as a plastic credit card or a bank statement and other customers in the service facility (Parasuraman et al., 1985). However according to Reimer and Kuehn (2004) ambient conditions like temperature, noise and odour are also interpreted as tangible dimensions of the service as they can be directly perceived with the human senses (Wakefield and Blodgett, 1999). The tangible evidence refers to the elements of the service outcome that individuals can point to in order to judge the quality of the service performance (Sweeney, 2008). However tangibles are less important for services where little time is spent in the service environment and the customer is primarily interested in the service result like appliance repair, pest control (Reimer and Kuehn, 2004) and laundry (linen and uniform).

Assurance

Assurance includes knowledge and courtesy of employees and their ability to convey trust and confidence (Zeithaml et al., 1990) in the service provider. Assurance reflects that customers feel safe in transaction; the service provider is consistently courteous and has knowledge and skills to deal with requests.

Reliability

Reliability dimension involves consistency of performance and dependability (Parasuraman et al., 1985). It means that the service provider performs the service right the first time and the firm honors its promises (Parasuraman et al., 1985). Specifically, it involves: accuracy in billing; keeping records correctly and performing the service at the designated time (Parasuraman et al., 1985). Furthermore it includes that the service is performed on time (Parasuraman et al., 1985).

Responsiveness

Responsiveness concerns the willingness or readiness of employees to provide services (Parasuraman et al., 1985). It involves timeliness of service: mailing a transaction slip immediately; calling the customer back quickly; giving prompt services (e.g., setting up appointments quickly) (Parasuraman et al., 1985). Furthermore it includes variables as willing to help and never too busy to respond (Parasuraman et al., 1985).

Empathy

Empathy includes caring, individualized attention the firm provides its customers (Zeithaml et al., 1990). Aspects include giving individual attention, understanding specific needs, there when needed and caring and responsiveness to needs (Parasuraman et al., 1985).

4.1.2 Nordic school

Grönroos (1982, 1984) defines the dimensions of SQ in terms of functional and technical quality. The technical quality includes the actual outcome of the service encounter (Grönroos, 1984). The technical quality indicates the outcome of the service act or what the customer receives in the service encounter (Brady and Cronin, 2001). Function quality is concerned with the interaction between the provider and recipient of a service (Ghobadian et al., 1994). Functional quality is defined by the customer's perceptions of the interactions that take place during the delivery (Brady and Cronin, 2001). Functional quality represents *how* the service is delivered (Grönroos, 1982) and technical quality *what* the customer is offered (Brogowicz et al., 1990). The image aspect is concerned with the customer's perceptions of the service organization and depends among others on technical and functional quality (Ghobadian et al., 1994). The image (i.e. corporate image) is the result of how consumers perceive the firm (Grönroos, 1989). Although image can be a SQ dimension, it is mainly based on the technical and functional quality and therefore will not be specifically addressed.

Grönroos (1983) defined six dimensions of good perceived SQ, these are: (1) professionalism and skills, (2) behaviour and attitudes, (3) accessibility and flexibility, (4) reliability and trustworthiness, (5) recovery (corrective action when something goes wrong), and (6) reputation and credibility. The first and last dimension relates to technical quality, the other dimensions relate to functional quality. The six criteria are based on existing knowledge according to Grönroos (1983) however there is no basis for documentation provided to support these dimensions (Brogowicz et al., 1990). Therefore these dimensions will not be further discussed.

In the Nordic and North American schools there is a consensus that SQ consist of *what* the customer is offered or receives and *how* it is offered or received, which Parasuraman et al. (1985) refers to 'outcome-related' and 'process-related' (Brogowicz et al., 1990). Management therefore should gain information and feedback with regard to both aspects of SQ (Brogowicz et al., 1990).

4.1.3 Combing the American and Nordic school

Brady and Cronin (2001) integrated the two streams of conceptualizations of SQ (North American and Nordic school) and developed a model based on both streams. According to Brady and Cronin (2001) their conceptualization can be extended to analyze SQ from an employee perspective (i.e. an internal customer perspective). In their model nine sub-dimensions define three determinants of SQ

which are: interaction quality, physical environment quality and outcome quality (Brady and Cronin, 2001). The 'physical environment quality' is added to the main aspects of SQ according to Grönroos (1983). Parasuraman et al. (1988) did mention the physical quality in the tangibles dimension which include physical facilities. The nine sub-dimensions of Brady and Cronin (2001) are evenly divided over the three determinants. The sub-dimensions have similar variables of the SERVQUAL model for instance attitude of personality of the service personnel (Brady and Cronin, 2001) and caring and individualised attention the firm provides its customers (Zeithaml et al.., 1990) which both are related to an attitude. The nine sub-dimensions: attitude (1), behaviour (2), expertise (3), ambient conditions (4), design (5), social factors (6), waiting time (7), tangibles (8) and valence (9), of Brady and Cronin (2001) are explained in Appendix III.

4.2 Internal service quality dimensions for health care and hospitals

According to Parasuraman et al. (1988), from the North American perspective, a generic set of dimensions can be applied to any service with minor wording changes, however other scholars (Marshall et al., 1998; Reynoso and Moores, 1995) state that dimensions should be suited to the particular service in question (Shawn and Haynes, 2004). Therefore in this paragraph the ISQ dimensions specifically for healthcare are discussed, followed by ISQ dimensions appropriate for hospitals. According to Neuhaus (1993) internal customers from different departments or hierarchical layers weigh the various dimensions of SQ quite differently. This is confirmed by a study of Stauss (1995) among managers indicating that managers from different departments or different hierarchical layers weigh the various dimensions of SQ differently. Therefore a distinction has to be made between the types of customers (i.e. per department) and their hierarchical position as this influences their perception. Since hierarchical position influences the perceived and desired ISQ, the ISQ dimensions will be further distinguished between ISQ dimensions at operational and ISQ dimensions at tactical level. Hence, in this paragraph the related dimensions for ISQ are discussed at operational level and afterwards ISQ dimensions at tactical level, which managers use to assess ISQ.

4.2.1 Internal SQ dimensions at operational level

Reynoso and Moores (1995) conducted research in ISQ specifically in *hospitals* and identified ten ISQ dimensions for nursing staff in public hospitals in England. The research is based on the American model, which is also focused more on operational level, as like Reynoso and Moores (1995) they did not specifically focussed on the customers at tactical level within the organisation but more on the operational level, the end-users. These ten identified dimensions relate to the expectations of the internal service received from other units. The five most important dimensions were: *reliability, responsiveness, competence, communication and understanding.* These dimensions with underlying aspects are presented in Appendix III.

Competence is expected to be of importance for hospitals ISQ because healthcare is human capital intensive and thus highly depends on the competences of employees. This is partly confirmed by Marshall et al. (1998) stating that customers of internal services are more knowledgeable with regard to service provision than customers of external services. Therefore they may be in a stronger position to assess the competence of service providers (Brandon-Jones and Sivestro, 2010) which make the dimension of SQ appropriate for internal end-users.

4.2.2 Internal SQ dimensions at tactical level

Various scholars (e.g. Vandermerwe and Gilbert, 1989, 1991; Gremler et al., 1994) have conducted research to identify the ISQ dimensions at tactical level, which specifically focuses on customers instead of end-users. However, studies on ISQ at tactical level in the health sector or in hospitals are scarce. Two studies relating to ISQ at tactical level in the health sector or hospitals were found and will be discussed further.

A study which not specifically focused on ISQ dimensions at tactical level in hospitals but on ISQ at a variety of corporations was performed by Vandermerwe and Gilbert (1991). Since this study focused on very diverse corporations, the study could also be applicable for internal services in hospitals. Vandermerwe and Gilbert (1991) found six internal service needs for executives (tactical level): relevance, reliability, within budget, cost, on time and responsiveness. These dimensions and their meaning are presented in Table 4.1.

Table 4.1: Tactical ISQ dimensions of Vandermerwe and Gilbert (1991)

Dimension	Definition
Relevance	The service provided is both generally useful, and also easy to use.
Reliability	The service is provided with a consistent level of quality: it meets specifications.
Within budget	Cost of the service does not exceed its expected price.
Cost	The cost of the service is appropriate.
On time	The service is delivered when promised.
Responsiveness	Service provider's willingness to serve and be flexible.

The fact that the dimensions **'cost'** and 'within budget' are applicable for executives at tactical level and are not found at operational level as important dimensions could be explained through the fact that customers are held responsible for budgets and end-users are not.

The external dimensions of Parasuraman et al., (1985) are highly consistent with the internal dimensions see Figure 4.3, as four out of five dimensions relate to the internal dimensions. Unfortunately the related variables of the study of Vandermerwe and Gilbert (1991) were not presented.

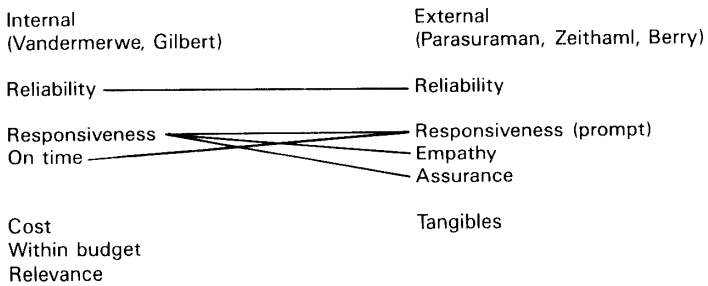


Figure 4.3: relations dimensions (Vandermerwe and Gilbert, 1991)

One study on ISQ dimensions at tactical level specifically for the health sector was found by Chaston (1994). Chaston (1994) found five dimensions which managers in health sector in the U.K. think are important in assessing performance of different departments (e.g. financial administration, nursing, analytical laboratories), these are:

- Ability to complete tasks accurately and dependably;
- Willingness to help and provide prompt service to internal customers;
- Ability to convey trust and confidence to internal customers;
- Ability to provide caring, individualised attention to internal customers;
- Appearance of department's physical facilities, equipment and personnel.

Despite the various dimensions found by several scholars, these dimensions discussed do show some similarities. For instance, the dimension of 'reliability' from Chaston (1994) and Parasuraman et al. (1985) relate with the dimension 'ability to complete tasks accurately and dependably' from Vandermerwe and Gilbert (1991). Furthermore the 'appearance of department's physical facilities, equipment and personnel' of Chaston (1994) can be related to 'tangibles' of Parasuraman et al. (1985).

When measuring ISQ, few crucial ISQ dimensions should be used. By choosing a few crucial dimensions instead of all explanatory dimensions, limited resources will be deployed in an effective manner (Andaleeb, 1998).The chosen limited amount of dimensions should be easily differentiated from each other, while when taken together it should capture the entire service experience (Sulek and Hensley, 2010) of customers and/or end-users.

4.3 Conclusion

SQ and ISQ research led to the determination of various SQ and ISQ dimensions (Table 4.2). The chosen ISQ dimension are presented in bold text in Table 4.2. ISQ dimensions which overlap with other ISQ dimensions were excluded. For instance, the dimension 'assurance' can be related to 'expertise'; therefore assurance is excluded. Since 'understanding' can be related to 'competence' and 'empathy' this dimension is also excluded at operational level. All other ISQ dimensions which encompass FM ISQ and are also mutually exclusive are included, see bold text in Table 4.2. When comparing the ISQ dimensions at operational and tactical level suitable for hospitals no essential difference in dimensions were found except the dimensions of 'costs' and 'within budget'. These ISQ dimensions at tactical level which are complementary to the ISQ and are excluding to other aspects will therefore also be included at tactical level. Based on these criteria the following dimensions are chosen:

(1) **Reliability** (Parasuraman et al., 1988; Vandermerwe and Gilbert, 1991; Reynoso and Moores, 1995), (2) **Responsiveness** (Reynoso and Moores, 1995; Parasuraman et al., 1988), (3) **Empathy** (caring, individualized attention, understanding each other needs) (Parasuraman et al., 1988; Chaston, 1994; Young and Varble, 1997; Reynoso and Moores, 1995), (4) **Tangibles** (Parasuraman et al., 1988; Chaston, 1994) and (5) **Costs** (Vandermerwe and Gilbert (1991) (6) **Competence** (Reynoso and Moores, 1995), (7) **Communication** (Reynoso and Moores, 1995) and (8) **Appearance of department's physical facilities, equipment and personnel** (Chaston, 1994).

Table 4.2: External and Internal SQ dimensions

Topic	Study	Dimensions
External SQ	Parasuraman et al. (1988)	**Reliability, Responsiveness**, Assurance, **Tangibles** and **Empathy**.
	Grönroos (1983)	Functional quality and Technical Quality *Sub-dimensions:* Professionalism and skills, Behaviour and attitudes, Accessibility and flexibility, **Reliability** and trustworthiness, Recovery and Reputation and credibility.
	Brady and Cronin (2001)	Interaction quality, Physical environment quality and Outcome quality.

		Sub-dimensions: Attitude, Behaviour, Expertise, Ambient conditions, Design, Social factors, Waiting time, **Tangibles** and Valence.
Internal SQ at *tactical level*	Vandermerwe and Gilbert (1991)	Relevance, **Reliability**, Within budget, **Cost**, On time and **Responsiveness**.
Internal SQ in hospitals At *tactical level*	Chaston (1994)	Accurately and dependably; Ability to complete tasks; Willingness to help and provide prompt service to internal customers; To convey trust and confidence to internal customers; Provide caring, individualised attention to internal customers and **Appearance of departments physical facilities, equipment and personnel**.
Internal SQ in hospitals at *operational level*	Reynoso and Moores (1995)	**Reliability, Responsiveness**, **Competence**, **Communication** and Understanding.

5. Data collection

Chapter five describes the data collection for the empirical study. The purpose of the empirical study is to explore if the ISQ dimensions from literature are also relevant to internal end-users and customers in a hospital setting regarding FM services. To answer this question a case study, including two in-depth interviews and an internal survey (i.e. questionnaires) are conducted for the FM department (IF) within Isala klinieken. The following section explains the two types of data collection. Therefore first the survey method including target population, sampling method and sample size will be addressed. Secondly the design of the questionnaire will be explained.

5.1 Data collection

A survey makes it possible to assess multiple ISQ dimensions. Surveys are usually used in the form of a post evaluation to gain insight into end-users preferences for facilities and services (Hebert and Chaney, 2012) which makes it suitable to use for expectations but also to measure the perceived ISQ. Besides, also the repetitive character of internal services makes the continuous employment of standardized questionnaires appropriate (Stauss, 1995). The survey consists of standardized questionnaires for the whole population, containing internal end-users. The questionnaires were designed and spread by ourselves through Parantion, an instrument to design and spread web surveys. As the end-users are already familiar with Parantion and it is used in other departments of Isala klinieken, this instrument is an appropriate tool to measure the ISQ. With Parantion invitations were send to end-users mail addresses on 8 October 2012. In their mail account they received an inventation with a link to the web survey. A reminder was also send by mail on 22 October 2012 to all end-users who did not or only partially filled in the questionnaire. On 5 November 2012 the web survey was closed. To encourage participation and gain a high response rate, RVE managers were informed of the questionnaire and asked to inform their employees and to ask them to fill in the questionnaire. Besides to encourage participation film vouchers were raffled among respondents. In order to avoid response bias the prize winners, as communicated to end-users, were drawn from the total respondents. In this manner, respondents will not fill in answers which in their perception, could increase their chance on winning a film voucher. However, this form of incentive may still cause bias because certain employees may find it more appealing than others.

Questionnaire design (validation of variables)
Although the encompassing dimensions are chosen to capture the service experience of different FM services in hospitals (Chapter 4), the service variables relating to the dimensions are made specific to the service. The ISQ dimensions with relating variables from literature were reviewed by three FM managers (managers Services, Logistics and Technique & Housing) and feedback from FM specialists. With their input the variables were further tailored to the target group, variables were modified, added or discarded based on the relevance of the variables, according to their judgement based on their previous experience with the services and with end-users, to the specific FM services. Although we identified some general ISQ dimensions which customers use to assess ISQ of departments from literature, the dimensions used for the services are not always the same, as not every dimension is relevant for every service.

After interviewing the FM managers and specialist in the service area's certain two new dimensions of ISQ were added. These dimensions are: 'costs' on operational level and 'accessibility' on operational and tactical level. Although 'flexibility' was also mentioned it is not included as a specific dimension as it can be related to the specific questions of 'response' and 'empathy'. ***Costs*** on operational level refer to the services wherefore internal end-users have to pay, for instance printed matter and food in the staff restaurant. It refers to the pricing or price level of the products. ***Accessibility*** of services involves the reachability/accessibility of the services for instance by telephone, or opening hours of specific services. It also relates to the visibility of security staff and the availability of the service like the availability of meeting rooms.
The operationalized ISQ dimensions into variables, after reviewing the variables to four experts (manager Logistics, Services , FM adviser and principal Technique and Maintenance), can be found in Appendix V.

In order to score all variables and gain a high response rate, three questionnaires were developed. One for Service, one for Technique and Accommodation and one for Logistics and Procurement. By developing three questionnaires, the results will also have to be analysed per type of questionnaire. To be able to reach a large number of end-users, mainly closed questions and Likertscales were used in the form of a standardized questionnaire. The questionnaires (Appendix VII) were divided into three parts. The first part consists of individual/demographic characteristics. This part with background variables make differentiations in the analysis possible. The second part consists of closed questions (Likertscales); they are used in the form of a standardized questionnaire because a large number of end-users will be researched. The variables which were reviewed (chapter 4) were translated into neutral statements which end-users could score, to avoid bias. The three questionnaires contained in total 102 statements which end-users could score their perceived and expected ISQ. Therefore the questionnaires in total contained 204 questions. We used a 7 point Likert Scale, with 1=very poor, 2=poor, 3=fairly poor, 4=neither poor or good, 5=fairly good, 6=good, and 7=very good, for response. Before asking to rate aspects of the ISQ of different services first was asked whether the respondent used the service last year. Since the instrument will be used on a yearly basis, only experiences from the last year are relevant. The third part consist of a question to rate the overall ISQ of the service provision of the FM department. Additionally the third part contains a few open questions to allow respondents to express what they feel is important and to identify areas which are not included in the survey (Pullman et al., 2005; Sulek and Hensley, 2010).

5.2 Sampling method

To be able to ask employees (end-users) questions of perceived and desired ISQ of all FM services of IF and stimulating a high response-rate, three questionnaires were developed. Also three simple random samples without replacement were taken to divide the whole population into three samples: one sample for the department Procurement and Logistics, one for Services and one for Technique and Building management services. The simple random sample selection is a sample in which all potential research units (note: end-users) have an equal chance of being included, regardless of their characteristics (Verschuren and Doorewaard, 2010, p. 162). The random sample selection are good for gaining a representative picture of the whole population (Verschuren and Doorewaard, 2010) since different kind of employees have an equal chance to be included like office staff, nurses, specialists and laboratory technicians. To avoid end-users are being asked for more than one

questionnaire a simple random sample selection without replacement was chosen. In order to avoid FM staff to assess their own provided service, all FM employees were excluded. To gain true estimates of the population the sample will be the largest possible. Isala klinieken has a population of approximately 5.714 employees including 296 medical specialists of which approximately 4.839 employees are end-users (FM staff excluded and staff at tactical and strategic level like RVE managers, operational directors, board of directors and board of supervisors are excluded).

5.3 Interviews

Although the main source of data collection is through questionnaires we also performed two interviews. The two interviews were held in order to gain insight into the ISQ of FM services at tactical level. One interview was held before the online survey was send to end-users and one interview after the online survey for end-users was closed. To answer the sub question several FM services were discussed in the interviews. These services which were included can be found in topic list in Appendix VI. To minimize the interference for the RVE managers the interviews were held at the interviewee's offices. After the interviews were conducted, the written notes were summarized into written text. Unfortunately the audio devices did not work and no audio tapes could be used. Therefore the interviews are totally based on the written notes during the interviews.

The interviews with RVE managers are semi-structured, meaning that the content and the structure of the questions are partly fixed (Rubin and Rubin, 2005). The RVE managers will have the room to elaborate on certain important dimensions and can express their opinion about why certain ISQ dimensions or variables of ISQ dimensions are perceived low and what the ISQ should be (desired ISQ). The RVE managers can also express why they think certain dimensions are important and which dimensions are less important. Among the interviewees one manager from the focus group RVE was consulted in a face-to-face interview. The focus group RVE member chosen is:

- Sido Lublink (RVE manager Gynecology and Obstetrics),

As this manager operates at the Sophia location, also one RVE manager will be chosen at the Weezenlanden location. The RVE manager that operates at Weezenlanden chosen is:

- Ria Knolters-Palmhof (RVE manager Intensive Care and Emergency Care).

By choosing these two managers who are responsible for nursing wards as well as capital intensive functions as IC and Emergency care, different kind of customers are included. Although the group is small, it does make sure different type of customers are consulted.

6. Results

The results from the empirical study will be presented in this chapter. First the customer data which contain two interviews with RVE managers will be discussed as it forms the basis for defining the ISQ at tactical level. Secondly the results of the questionnaire will be discussed at operational level. The data from the questionnaire were imported from Parantion into SPSS 20.0 for statistical analysis. By using larger amounts of data, the data was processed and analyzed in a quantitative way (Verschuren and Doorewaard, 2010). The data however collected through interviews will be analyzed in a qualitative way. The chapter finishes with the data analysis including validity and reliability of the empirical study.

6.1 Customer data analysis

Two of the 16 RVE managers were interviewed for in-depth information about ISQ of FM services in the hospital. Both managers have different backgrounds and therefore will likely have different views on perceived and expected ISQ. These two interviews are too few to obtain representative information of the perceived and expected ISQ of IF. However they do give indications for improvements and more in-depth information in the causes of low and/or high perceived ISQ of different customers. The results of these qualitative interviews will be described in the following three subsequent paragraphs.

6.1.1 Services

For Services several services can be improved. Firstly, the ISQ of cleaning can still be improved. The ISQ of cleaning is perceived lower than the desired ISQ. Reasons given are: repeatedly not sufficient cleaning; lack of cleaning hours; sickness absence and incompetence. Cots or more or less cost savings on cleaning is also given as a reason since more cleaning hours will create higher costs. Furthermore, a recommendation was given to have someone who keeps overview if everything is cleaned well.

Besides cleaning also catering was seen by one interviewee as low ISQ. Catering is perceived as moderate, this has to do with that it is always the same, may sometimes be something more. Although the range is perceived as good, herein they have more choice nowadays. Furthermore, meeting rooms are perceived as low ISQ. Reasons given were: rooms are too small; there are too few and the rooms are not representative. The meeting rooms should have more charisma. However the staff are perceived as very helpful and projectors, flip charts, etc. are perceived good.

The use of volunteers is perceived very well. They are perceived as willingly and are well deployed. According to one interviewee IF could expand their ISQ delivery by using more volunteers to contribute to the ISQ, as host or hostess. Also the reception is perceived well, just as the physical environment of the staff restaurant.

6.1.2 Technique & Maintenance

The buildings of Isala klinieken (Sofia and Weezenlanden) are perceived as low quality as these are perceived as old. Besides the building also the furniture is perceived as old and not representative; additionally the office chairs are also not ergonomic. The old building and furniture does not give a

good impression to guests. Another aspect which is perceived as low quality according to one interviewee is the indoor climate in the workplace.

Reactions on security staff varied as well as positive and negative. Reactions according to arrangements are very positive. When assistance is required and the RVE manager reports it, the security staff will keep their appointments. However the competences of security staff could be better, for instance they should be capable of handling with aggressive patients or visitors.

Also the reactions on Relocation & Design (Nl. verhuizing & inrichting) vary. Some positive reactions about their performances and their project management is perceived as good. Although with the relocation the services are less used and therefore the experience of their services is based on previous years. The decisiveness of the department can be better, currently they require some guidance.

Caretakers and technicians are friendly and representative, according to one interviewee, 'they are always in uniform and communication with them goes well'. 'If there is a failure this is quickly remedied'. Furthermore it is perceived as a positive experience that every department has their own care taker by on interviewee.

In addition, it was stated that the outside terrain is well maintained, attention is given to the outside grounds and landscaping. 'Cigarette butts are cleaned everyday etc. and the main entrance and parking area are neatly'.

6.1.3 Procurement & Logistics

The services for logistics can still be improved. For instance, the inventories of linen are not always sufficient. Sometimes there is too little linen. A reason given is unlucky moments of scanning of inventory, which happens in the evening and not in the weekends. To improve ISQ of linen supply the scanning might be performed twice a day and also in the weekends. With regard to linen services, the uniforms are too few. This has to do with end-user stash up uniforms to prevent a leakage in uniforms. In the new situation this will be different, with the advent of automatic issuance of uniforms. The sizes of uniforms are perceived as insufficient. A recommendation was given to have separate uniforms for different functions. Other uniforms would be better, like the uniforms of hospital porters who have separate uniforms so you can see that they have different functions. This could also be done for the other "white uniforms". Ideas could be gained from hospital uniforms in other countries, which sometimes look more representative. Furthermore the linen products are not always good delivered with regard to products quality, as linen can be damaged (i.e. broken).

Furthermore both interviewees recognize that the transition (outsourcing) to Hospital Logistics created unnecessary problems which could have been prevented through better preparation. Until to date, still some problems occur due to this transition which should already have been solved.

Hospital porters are not deployed in the evening; however both RVE managers do state that they should also be available at evening hours since after 17.00 still surgery patients have to be returned.

Aside from the services which were perceived less, some services were perceived as good quality. These are repro center, mail service and the printers are perceived as good ISQ. People who have to print more often have a printer nearby.

Concluding remarks

A new topic which was not in the topic list (Appendix VI), but might be important for RVE managers is the ISQ of communicating management information especially with regard to finance issues. This is perceived less than they desire, therefore insufficiently. The ISQ could be improved by performing budget rounds earlier, as in consultation risks can be discussed.

RVE managers do not daily use all FM services; some services may be difficult for them to have a good impression of the quality, for instance waste disposal. This service should therefore not be further included in the interview topic list at tactical level.

Furthermore it was mentioned that for the RVE managers there are already enough project groups and a focus group RVE. Therefore no more focus groups should be created to improve ISQ as it would take them too much time.

6.2 End-user data analysis

The conceptual model based on literature was used for the internal end-users in the questionnaire. In the questionnaire the expectations (desired service quality) and perceived ISQ was measured of end-users and customers on Logistics, Services, Procurement and Technique & Maintenance. The gap between expectations and perceived SQ gives indications for improvements. The collected data from the three questionnaires will be presented and analyzed by using univariate analysis, paired samples t-test, principal component analysis as an extraction method and regression analysis. These different analyses and their results will be explained in the following paragraphs.

6.2.1 Response and non-response

Altogether 4.839 questionnaires were sent to internal end-users of IF on 8 October 2012. 1.425 Usable questionnaires were returned by end-users. The usable questionnaires contained the respondents who, at least used half of the services of one department, in the questionnaire, except for the respondents who are working in the laboratory. Respondents working in the laboratory are a specific group since they are only able to make use of a small number of services. The response rate reached 29,4% for the internal end-users. The non-response of end-users is partly caused by vacations and leave, as more than 160 mails for out of office were returned. Another reason which was given is low experience with the service like Procurement and Logistics or a low work experience (less than half a year) within Isala klinieken. Other reasons which were received were uncertainty about the anonymity of the research, since the research was a closed survey and people received a personal link by mail. Although the research could not be performed totally anonymous because it concerned a closed survey, it was communicated that the results would be dealt with anonymously. Still this uncertainty could cause non-response bias, when end-users were concerned about the anonymously choose to not participate or response bias when they did participate in the questionnaire.

6.2.2 Descriptive statistics

To describe the background information (descriptive statistics) of the respondents univariate analysis were performed. Background information of the respondents is necessary to make sure they form a representative research group of the total population (i.e. for generalization) and to better interpret the results.

The respondents were mostly females (86%) and males (14%) which is in line with the demographics of the total population of Isala klinieken. Also the average age of the respondents, which 43 years old, is conform to the total population. Furthermore the average work experience within Isala klinieken of the respondent lies on 13,5 years (Appendix VIII). This relatively high amount of work experience distinguishes internal end-users of FM services in hospitals from other organizations. Most of the respondents were located at Sophia (61,7%) and Weezenlanden (47,5%) (Figure 6.1) and worked at a nursing ward (34,5%) outpatient clinic (11,7%) or office (11,7%) (Figure 6.2). Since some end-users work at several locations and/or in several departments, the total percentage in Figure 6.1 and 6.2 are above 100%.

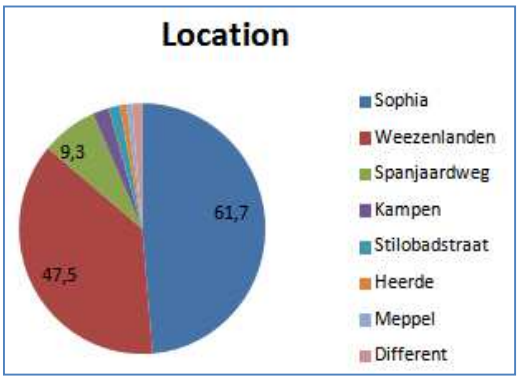


Figure 6.1 Location of respondents

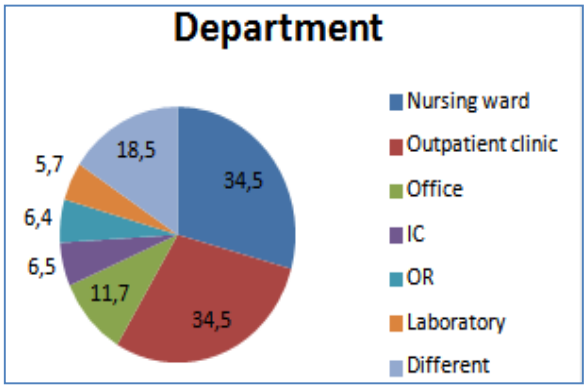


Figure 6.2 Department of respondents

The demographic variables of the respondents were analysed and compared to the whole population of Isala klinieken (Table 6.1). The amount of women within Isala klinieken is rated at 81,27%, for the respondents the amounts rated from 84% until 89%. The amount of men was rated at 18,73% against 11% until 16% for the questionnaires. Furthermore the average age of 42 within Isala klinieken was 36 until 50 years old for the respondents. We can conclude the respondents give a good representative reflection of the whole population.

Table 6.1 Response rates end-users

Staff	Population level (at 31-12-2011)	Response	Total
Number of women	4.403 (81,27%)		
-Procurement & Logistics		405 (85%)	
-Services		456 (89%)	86%
-Technique & Housing		363 (84%)	
Number of men	1.015 (18,73%)		
-Procurement & Logistics		74 (15%)	
-Services		57 (11%)	14%
-Technique & Housing		71 (16%)	
Average age	42		
-Procurement & Logistics		50	
-Services		41	43
-Technique & Housing		36	

The range of perceived service variables was from 1 (very low perceived service) to 7 (very high perceived service). For the mean perceived ISQ, thus exclude expected ISQ, two item means (*M*) scored between three (fairly poor) and four (neither poor or good, see §5.1).These were amount of parking facilities at 3,29 with a standard deviation (SD) of 1,63 and climate at the workplace (temperature, air etc.) at 3,93 (SD 1,47). The highest perceived ISQ variable means were: response of your question or order of reprographic center at 6,20 (SD 0,75), friendliness of staff service bureau at 6,10 (SD 0,82) and caretakers and technicians at 6,02 (SD 0,79).

All means of end-users expectation scored well above five, therefore no low expectations were found. Expectations on friendliness of staff of service bureau with a mean of 6,31 (SD 0,62) and friendliness of staff of reception *M* 6.29 (SD 0,60) and telephony *M* 6.28 (SD 0,63) scored the highest.

The internal end-users scored the overall ISQ of IF at *M* 5.48 (SD 0,81) on a scale of 1 until 7, lying between fairly good and good. The overall ISQ per location, per department, per function or related to amount of work experience is not rated very differently (Appendix VIII, p. 83). Although the overall ISQ score of IF was sufficient, the overall mean perceived ISQ is -0,71 which means that the overall ISQ end-users receive (*M* 5.30) is lower than which they expect (*M* 6.01).

6.3 Principal component factor analysis and reliability check

A Principal Component Analysis (PCA) is conducted to identify the ISQ dimensions which end-users use to assess the ISQ of IF and for data reduction to gain a manageable set of ISQ dimensions for the ISQ measurement model. The PCA helps to research interrelationships between variables in the questionnaire (Heus et al., 1995) relating to several FM services within Isala klinieken. It is very suitable instrument to find the most important interrelationships within a set of variables, which makes it a suitable instrument for data reduction (Heus et al., 1995) for all variables (102 total) in the questionnaire and find the appropriate and a manageable set of ISQ dimensions. Therefore, in order to reduce the total number of variables, an exploratory factor analysis was conducted, using principal components with Varimax rotation. With an exploratory analysis we try to achieve the best model by exploring the loadings of variables and expect to group them together with a PCA. A PCA with orthogonal rotation was used to make sure factors remain uncorrelated and Varimax rotation to better interpret the factors. The outcome will be used as input for *the analysis of perceived and expected ISQ* but also for the subsequent *multiple regression analysis*, since the PCA is followed by a multiple regression analysis. Four principal component analyses could be executed according to the suitability tests: Kaiser criterion and Bartlett's test of sphericity. It is not possible to do a PCA over all three questionnaires combined according to these suitability tests and because we used three different questionnaires. Furthermore, since Procurement and Logistics contained different end-users it was necessary in order to gain reliable results to divide the services in (1) Procurement and ordering desk and (2) Logistics, and thus conduct two PCA's for this single questionnaire[1].

[1] The respondents for Procurement and Logistics, did in most cases only fill in one part of the questionnaire which was only statements for Procurement or only for Logistics. This is caused by the fact that only a certain group of employees is allowed to make use of Procurement. This group of employees do most often not use services of Logistic. Since most respondents did not fill in both parts it is not possible to perform a PCA on both services combined, but only in parts. Therefore one PCA was conducted for Procurement and one for Logistics.

The perceived ISQ is used for the PCA as these PCA's identified more factors than the PCA's for expected ISQ. Since the ISQ is based on the perceived minus expected service quality, the perceived service quality is used as starting position. Therefore, a PCA should be used for the perceived service quality. Besides, when performing the multiple regression analyses after a PCA, the components of perceived ISQ of IF from the PCA have the most influence on the overall ISQ of IF, compared to the expected ISQ components from the PCA. Thus the perceived ISQ dimension have more influence on the overall ISQ of IF than the expected dimensions, therefore we choose to make use of the perceived ISQ dimensions. Due to time constraints it was not possible to do a factor analysis over the difference between expected and perceived services. Factors with eigenvalues equal to or larger than one and factor loadings above 0.4 were retained.

Services

After a PCA on the perceived ISQ variables, eight components are subtracted (Appendix IX). The Kaiser-Meyer-Olkin (KMO) value of 0,88 lies above the acceptable limit of 0.5 (Field, 2009). The KMO value indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors (Field, 2009). Bartlett's test of sphericity $X^2 = 912{,}041$, $p < 0{,}001$ indicate the correlations between variables were sufficiently large for a PCA. The Kaiser's criterion with eigenvalues larger than one indicates an eight component factor solution. The eight components in combination explained 65% of the variance of the overall ISQ of IF with respect to Services. When labelling the new component, we took the variable loadings into account. Furthermore we looked at similar characteristics of the variables and compared the results with the results of the literature study. The first factor can be typed as **service bureau** since all variables relating to the services of the service bureau cluster together to one factor. Friendliness and skills of staff but also accessibility like accessibility by telephone and opening hours. Other variables included were: information on the progress of a question, message or fault; speed of handing questions or complaints and accuracy of fielding questions or messages. Since these are all services of the service bureau it is labelled as **service bureau.** The second factor contains variables of the services of reception and telephony. Friendliness of staff, clear explanation to questions and expertise of staff were variables for both the reception and for telephony, therefore we will define the factor as **reception and telephony.** The variables relating to the staff restaurant cluster into two factors. The first factor includes friendliness, representativeness and helpfulness of employees and rate of payment which can all be related to interaction with staff and thus interaction quality. Therefore the factor is labelled as **staff restaurant interaction quality.** The second factor relating to the staff restaurant contains variables as: design and size of the restaurant, quality of products, assortment of products, prices and opening hours. These variables relate to the physical environment as well as to the outcome quality. This factor is labelled as **staff restaurant physical environment and outcome quality**. The fourth factor is typed as **cleaning** as it contains variables of cleaning general spaces, cleaning of sanitary facilities, cleaning of direct work environment and in lesser extent correctness of handling requests and complaints. The sixth factor contains aspects of meeting rooms like representativeness, design, availability, household- and technical support of the meeting rooms. As all variables relate to meeting rooms, it is labelled as **meeting rooms.** The following factor is typed as **bed conditioning** since it contains the relating aspects: delivery of beds, cleaning and preparation of beds. The variables quality of coffee and/or thee and quality of warm drinks and other vending machines cluster together. These variables

relate to catering, therefore the last factor is labelled as **catering**. The previous factors with their labels are presented in Table 6.2. The relating variables can be found in Appendix IX.

Table 6.2 Factors (dimensions) Services

Dimensions	Number of variables	Cronbach's alpha	Cumulative % of variance
Service bureau	8	0,91	14,34
Reception & Telephony	5	0,92	24,94
Staff restaurant physical environment and outcome quality	5	0,76	33,38
Cleaning	4	0,82	40,87
Staff restaurant interaction quality	4	0,84	48,18
Meeting rooms	4	0,79	55,04
Bed conditioning (Dutch Beddencentrale)	3	0,79	60,71
Catering	2	0,83	65,32

Technique & Accommodation

After a PCA on the perceived ISQ variables, six components are subtracted (Appendix IX). The KMO value of 0,86 lies above the acceptable limit of 0,5 (Field, 2009) indicating the factor analysis yields distinct and reliable factors. Bartlett's test of sphericity $X^2 = 570,47$, $p < 0,001$ indicate the correlations between variables were sufficiently large for a PCA. Six components with eigenvalues over Kaiser's criterion of one and in combination explained 62% of the variance of the overall ISQ of IF with respect to Technique & Accommodation. The first factor contained variables relating to maintenance and appearance of the building. Included variables are: decoration and furnishing of the building; maintenance condition of the building; maintenance condition of the interior; condition of the terrain; interior planting; greening; quality of furniture; indoor climate at the workplace and decoration and design of the workplace. Half of the variables relate to maintenance condition and half of the variables relate to the appearance of the building. Therefore this first factor is called **maintenance condition and appearance of the building**. The following factor is labelled as caretakers and technicians since it includes the variables: friendliness of staff; willingness of employees to respond to specific needs; clarity where failure to report; clarity of explanation on equipment; speed of handling faults or alerts; representativeness of technicians and caretakers and correctness handling of faults or alerts. Since the variables with the highest loadings are operations of caretakers and technicians, the factor is labeled **caretakers and technicians.** The third factor relate to **safety,** including feeling of safety in the area of Isala klinieken, within the building and at their workplace. The fourth factor contains the two variables: speed of processing inquiries or complaints and visibility of surveillance employees. Both variables relate to **security**, which is the new label of the factor. The following factor contained the variables daylight in the workplace and artificial light in the workplace. By combining both variables the factor can be called **light at the workplace.** Variables which also cluster together are: signage in and outside the building; number of places in the bike shed and number of parking spaces. All three variables relate to the accessibility of Isala klinieken, therefore the last factor is labeled: **accessibility of Isala klinieken.** The factors with the labels are presented in Table 6.3. The relating variables can be found in Appendix IX.

6.3 Factors (dimensions) Technique & Accommodation

Dimensions	Number of variables	Cronbach's alpha	Cumulative % of variance
Maintenance condition and appearance of the building	9	0,91	19,58
Caretakers and technicians	7	0,87	34,69
Safety	3	0,81	43,28
Security	2	0,81	49,75
Light at the workplace	2	0,76	56,11
Accessibility of Isala klinieken	3	0,56	62,24

Procurement and Ordering desk

After a PCA on the perceived ISQ variables, three components are subtracted (Appendix IX). The KMO value of 0,88 lies above the acceptable limit of 0,5 (Field, 2009) indicating the factor analysis yields distinct and reliable factors. Bartlett's test of sphericity $X^2 = 615,22$, $p < 0,001$ indicate the correlations between variables were sufficiently large for a PCA. Three components with eigenvalues over Kaiser's criterion of one in combination explained 65% of the variance of the overall ISQ of IF with respect to Procurement and Ordering desk. The first, eight variables which cluster together to one component contains: friendliness of the staff; willingness to respond to specific needs; expertise of the staff; helpfulness of the staff; advice on buying questions; information on prices and price changes, delivering on promises and quality of products. All these variables relate to the function of procurement, therefore the factor is called **procurement.** The second component contained three variables: friendliness of staff of order desk; information on the progress of orders and accessibility of the order desk. All three variables relate to the services of the **order desk**, which is the new name of the factor. The last factor contained the variables: lead time of the order; clarity of the order process; physical condition of items ordered and prices of items. All factors relate to ordering items, therefore we call the factor: **orders.** The variables that cluster on the same components with labels are presented in Table 6.4. The relating variables can be found in Appendix IX.

6.4 Factors (dimensions) Procurement and Ordering desk

Dimensions	Number of variables	Cronbach's alpha	Cumulative % of variance
Procurement	8	0,93	34,01
Order desk	3	0,79	50,06
Orders	4	0,75	65,49

Logistics

After a PCA on the perceived ISQ variables, seven components are subtracted (Appendix IX). The KMO value of 0,80 which lies above the acceptable limit of 0.5 (Field, 2009) indicating the factor analysis yields distinct and reliable factors. Bartlett's test of sphericity $X^2 = 483,64$ $p < 0,001$ indicate the correlations between variables were sufficiently large for a PCA. Indicating the correlations between variables does significantly differ from an identity matrix. An identity matrix is problematic as we are searching for clusters of variables that measures similar ISQ aspects, and thus are looking for correlations, which is not the case in an identity matrix. Seven components with eigenvalues over

Kaiser's criterion of one were extracted which in combination explained 67% of the variance of the overall ISQ of IF with respect to Logistics. For the first factor all aspects of the reprographic center clustered together. The variables are: expertise of the staff; information on the progress of your inquiry or order; speed of processing your inquiry or order; quality of the delivered products and price level. Therefore the factor is called **reprographic center.** The following factor and the seventh factor both relate to linen services, however they do relate to different ISQ aspects of linen services. The second factor relates more to the physical environment and outcome quality while the seventh factor can be more related to the interaction quality of ISQ. The variables relating to the first component linen services contained the variables: cleaning of uniforms cleaning of linen; range of linen; supply of linen and collection of used linen. Therefore the first factor, since all variables relate to the outcome of the linen services, is labeled as **linen services, outcome quality.** The variables relating to second factor of linen services are: friendliness of staff and accessibility by telephone. These two variables relate to the interaction or ability for interaction with the employees of linen services. Therefore we call the factor **linen services, interaction quality.** The third factor contained the variables: scanning stocks for replenishment; range of stock of the department; supply of the department; loading the items and physical condition upon delivery of items. These variables are relating to **fine distribution**, which will be the new label of the factor. The fourth factor contained the variables: responsiveness of hospital porters; availability of hospital porters and timely transport of patients, patient-related products or beds. All three variables are functions of hospital porters, therefore we call the factor: **hospital porters.** The following factor contained the variables: quality of the printing and/or copying accessibility and availability of printers/multifunctionals in your building; waste collection at your workplace and waste collection in your building. The variables relate to the printers as well as to waste collection, therefore we call the factor **printers & waste.** The last factor contained the two variables: accurate delivery of mail and delivery times of mail. Since both variables are relating to **mail**, this is the name of the factor. The previous factors with labels are presented in Table 6.5. The relating variables can be found in Appendix IX.

Table 6.5 Factors (dimensions) Logistics

Dimensions	Number of variables	Cronbach's alpha	Cumulative % of variance
Reprographic center	5	0,87	12,80
Linen services outcome quality	5	0,84	24,39
Fine distribution	5	0,84	35,74
Hospital porters	3	0,84	45,29
Printers & Waste	4	0,76	54,01
Mail	2	0,84	60,65
Linen services interaction quality	2	0,83	66,95

Reliability check

The reliability means that the measure (i.e. the questionnaire) consistently reflects the construct that it is measuring (Field, 2009). A commonly used measure to test the reliability of a group of variables that measure a factor is *Cronbach Alpha* (Large and König, 2008). According to Hair et al. (2006) Cronbach Alpha requires a value larger than 0,7. Since all other factors of the PCA score above 0,7 (Tables 6.2 until 6.5) except accessibility of Isala klinieken (Table 6.3), we can conclude that all other

variables within the factors do measure the same construct. The instrument of 24 dimensions is reliable.

6.4 Paired sample t-test & Overall ISQ of IF

In order to gain a broad impression of the ISQ of IF and therefore to find out if the expected service differed from the perceived service, a paired t-test was conducted among the different variables. A paired t-test, also called dependent-means t–test, is utilized to establish the existence of a significant difference between end-users desired and perceived service. A comparison table will be utilized to compare means for the end-users expectations and perceptions of different variables, as well as the ISQ gap score (perceived – expected service). A paired-samples t-test was conducted to compare the mean value of perception with the mean value of expectation and to calculate their difference on variable level. The 24 factors which are extracted from the PCA are presented in Table 6.6, called ISQ dimensions, with their average perceived service, expected service and the ISQ gap scores. The relating variables per dimension can be found in Appendix XI. The larger gaps show less overall perceived ISQ, which therefore needs more attention by managers to improve on these services. In the following two paragraphs 6.4.1 and 6.4.2 the six dimensions with the largest gap scores (gap ranking of 19 until 24) and the six smallest gap scores (gap ranking of 1 until 6) will be discussed with their relating variables to give an overall impression of the perceived ISQ of IF. The six largest gap will be presented because with a range of -0,18 until -1,67, a median gap of -0,69 and the first quartile on -0,96, gaps above -0,96 can be perceived as large. Just as gaps below the third quartile of -0,39 can be perceived as small, see Figure 6.3.

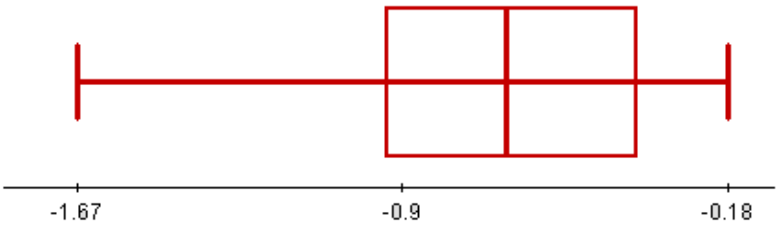


Figure 6.3 Box plot of mean ISQ dimension gaps scores

Table 6.6 Mean scores of ISQ dimensions

ISQ dimensions	Average perceived Service (SD)	Average expectations (SD)	Average gap / ISQ score	Gap ranking (best to worst)	Department
Procurement	5,49 (1,05)	5,92 (0,90)	-0,44*	8/9	Procurement
Orderdesk	5,24 (1,16)	5,82 (0,88)	-0,58*	11	
Orders	4,82 (1,41)	5,63 (1,14)	-0,80*	17	
Reprographic center	5,97 (0,88)	6,15 (0,71)	-0,18*	1	Logistics
Mail	5,76 (0,98)	6,10 (0,86)	-0,35*	4	
Linen services, interaction quality	5,38 (1,19)	5,93 (0,96)	-0,54*	10	
Printers & Waste	5,31 (1,20)	5,98 (0,97)	-0,67*	12	
Hospital porters	5,47 (1,08)	6,18 (0,79)	-0,71*	14	
Linen services, outcome quality	4,95 (1,33)	5,98 (1,05)	-1,04*	20	

Fine distribution	5,01 (1,28)	6,06 (0,95)	-1,07*	21	
Reception & Telephony	5,96 (0,75)	6,25 (0,63)	-0,29*	2	Services
Service bureau	5,80 (0,97)	6,17 (0,73)	-0,37*	5/6	
Staff restaurant (interaction quality)	5,72 (0,97)	6,13 (0,78)	-0,41*	7	
Bed conditioning	5,46 (1,10)	6,14 (0,88)	-0,70*	13	
Catering	5,23 (1,19)	6,00 (0,88)	-0,77*	16	
Meeting rooms	5,30 (1,11)	6,04 (0,80)	-0,75*	15	
Staff restaurant (physical environment and outcome quality)	5,12 (1,33)	6,05 (0,93)	-0,92*	18	
Cleaning	4,67 (1,40)	6,00 (1,10)	-1,35*	22	
Security	5,67 (1,08)	5,98 (0,95)	-0,30*	3	Technique & Accommoda-tion
Caretakers & Technicians	5,74 (0,96)	6,11 (0,76)	-0,37*	5/6	
Safety	5,77 (0,94)	6,20 (0,75)	-0,44*	8/9	
Light at the workplace	4,95 (1,40)	5,93 (0,99)	-1,00*	19	
Maintenance condition and appearance	4,38 (1,34)	5,84 (1,07)	-1,47*	23	
Accessibility Isala klinieken	4,20 (1,16)	5,88 (1,25)	-1,67*	24	
Average total	5,15 (0,94)	6,02 (0,14)	-0,72		

**) P* =0,000

Note: Scale perceived and expected ISQ ranges from 1 (very poor quality) to 7 (very good quality); gap/ISQ score is perceived – expected service quality.

6.4.1 Six smallest dimension gaps

The smaller gaps related to Logistics (two small gaps), Technique & Accommodation (two small gaps) and Services (two small gaps). These six smallest dimension gaps, with a gap ranking from 1 until 6 in Table 6.1, will be discussed further on variable level. In Appendix X the full results of paired sample t-test for the six smallest dimension on variable level is presented. The smallest gap indicate the ISQ dimensions which are perceived the best within IF. To better understand why these dimensions scored best, the results on variable level of the best perceived ISQ dimensions are discussed. The six smallest gaps are presented from small to large.

Reprographic center had the smallest gap compared to the gap scores of other dimensions. This ISQ dimension focused on expertise of staff, information on the progress of an inquiry or order, speed processing of an inquiry or order, quality and price level of the delivered products. End-users are the most positive about the speed of handling of their inquiry or order by the reprographic center (*M* = -0,06, *SD* = 0,48), *p* = 0,114, which formed no gap, and price level of the delivered products of the reprographic center (*M* = -0,20, *SD* = 0,59), *p* = 0,000. The significance value of speed of handling their inquiry or order by the reprographic center is not significant (*p*>0,05), therefore there is no significant difference between the expected and perceived service. There is no evidence to show that the expected service is significantly larger or smaller than the perceived service.

Reception & Telephony had the second smallest gap score. Variables as friendliness of staff, competence of staff and explanation to questions were included. The explanation to questions by reception (*M* = -0,25, *SD* = 0,52), *p* = 0,000 and telephony (*M* = -0.26, *SD* = 0,58), *p* = 0,000 had the smallest gap scores.

Security focused on speed of processing of inquiries or complaints by surveillance staff and visibility of surveillance staff. The ISQ of speed of handling of inquiries or complaints by surveillance staff was the highest (*M* = -0,13, *SD* = 0,99), *p* = 0,197. As the p value is larger than 0,05 there is no significant difference between the perceived and expected service quality. Therefore there is no evidence to show that the expected service is significantly larger or smaller than the perceived service.

Mail focused on accurate delivery of mail and delivery time of mail. Both variables accurate delivery of mail (*M* = -0,32, *SD* = 0,77), *p* = 0,000 and delivery time of mail (*M* = -0,38, *SD* = 0,88), *p* = 0,000 contained relatively low gap scores.

Service bureau focused on several aspects. Friendliness and skills of staff but also accessibility like accessibility by telephone and opening hours. Other variables included were Information on the progress of a question, message or fault; speed of handing questions or complaints and accuracy of fielding questions or messages. End-users are very positive about the ISQ of accuracy fielding questions or messages (e.g. call transfer, redirect) of the service bureau (*M* = -0,23, *SD* = 0,56), *p* = 0,000. Second the friendliness of the staff (*M* = -0,20, *SD* = 0,59), *p* = 0,000 and willingness to respond to specific needs of the service bureau is perceived high (*M* = -0,24, *SD* = 0,68), *p* = 0,000.

Caretakers & Technicians contained the following variables: friendliness of staff; willingness of employees to respond to specific needs; clarity where failure to report; clarity of explanation of

equipment; speed of handling of faults or alerts; representativeness of technicians and caretakers and correctness handling of faults or alerts. Among these variables the ISQ of friendliness of caretakers and technicians (*M* = -0,18, *SD* = 0,63), *p* = 0,000 and their representativeness (*M* = -0,24, *SD* = 0,69), *p* = 0,000 scored the smallest gaps.

6.4.2 Six largest dimension gaps

The ISQ dimension with large gap scores related to Technique & Accommodation (three large gaps), Logistics (two large gaps) and Services (one large gap). These six largest dimensions gaps, which have a gap ranking of 19 until 24 in Table 6.1, will be further discussed on variable level. In Appendix X the full results of paired sample t-test for the six largest dimension on variable level is presented. The largest gaps indicate the ISQ dimensions which are perceived the least within IF. To better understand why these dimensions scored the least, the results on variable level of the lowest perceived ISQ dimensions are discussed. The six largest gaps are presented from large to small.

Accessibility Isala klinieken had the highest gap score of all ISQ dimensions. The dimension focused on signage in and outside the building, bicycle parking facilities and number of parking spaces for cars. All variables had a mean gap score above -1,0. The largest gap was for the number of parking spaces (*M* = -2,39, *SD* = 2,00), *p* = 0,000.

Maintenance condition and appearance contained the second highest gap score of all ISQ dimensions. The factor described aspects relating to maintenance and appearance of the building. All variables except maintenance condition of terrain and landscaping around the building scored a bigger gap than -1,0. The largest gap was for indoor climate at the end-users workplace (temperature, air, etc.) (*M* = -2,02, *SD* = 1,78), *p* = 0,000. Furthermore maintenance condition of the interior (*M* = -1.73, *SD* = 1,58), *p* = 0,000 are perceived as low ISQ as well as the ISQ of the maintenance condition of the building (*M* = -1,80, *SD* = 1,54), *p* = 0,000. Furthermore the ISQ of furniture (comfort, functionality and ergonomics) (*M* = -1,69, *SD* = 1,65), *p* = 0,000 is perceived low.

Cleaning focused on correctness of handling requests and complaints, cleaning of common areas, sanitary facilities and immediate work environment. All variables except the correctness of handling requests and complaints scored bigger gaps than -1,0. End-users were the least positive about the ISQ of cleaning of sanitary facilities (toilets etc.) (*M* = -1,68, *SD* = 1,69), *p* = 0,000 and cleaning of their work environment (*M* = -1,51, *SD* = 1,62), *p* = 0,000.

Fine distribution focused on maintaining the departments stock level like: scanning of inventories, supply of the department, range of the departments assortment and physical condition of delivered items etc. The highest gap scores are for supply of the department (*M* = -1,79, *SD* = 1,69), *p* = 0,000 and scanning inventories for replenishment (*M* = -1,42, *SD* = 1,48), *p* = 0,000.

Linen services outcome quality, focused on the cleaning of uniforms and small linen (Dutch Platgoed). Other variables included are assortment of small linen and supply and collecting of small linen. End-users were the least positive about the ISQ of cleaning of uniforms (*M* = -1,76, *SD* = 1,69), *p* = 0,000 and small linen (*M* = -1,05, *SD* = 1,37), *p* = 0,000.

Light at the workplace included daylight in the workplace and artificial light in the workplace. Here only daylight in the workplace scored a gap bigger than -1,0 (*M* = -1,14, *SD* =1,59), *p* = 0,000 artificial light in the workplace had a smaller gap (*M* = -0,87, *SD* = 1,23), *p* = 0,000.

6.4.3 Overall variables

All gap scores of the variables were negative, ranging from *M* -2,39 to -0,06. Most scores of the Paired Samples T-Test (100 out of 102 variables) have a *p*<0,05, which implies that there is a significant difference between the means of these variables of perceived and expected ISQ. The expected service is thus significantly better than the perceived service. A *p*<0,05 gives enough confidence to assume the model explains a sufficient amount of variation to reflect what's genuinely happening in the whole population (Field, 2009).

In general it is found that end-users expectations of ISQ of FM services within Isala klinieken based on most variables (100/102) did not meet their expectations. However, two variables 'speed processing of inquiries or complaints by surveillance staff' and 'speed processing of questions of orders of the reprographic center' did meet the expectations of end-users.

6.5 Multiple regression analysis

After a PCA is conducted and the dimensions are manageable a multiple regression analysis (enter method) was conducted to investigate which extracted components of ISQ are the most important predictors of the ISQ of IF. In this respect the extracted components are the independent variables and the overall score of ISQ of IF is the dependent variable.

The data of all regression analyses showed no multicollinarity (*r*>0,9) which means that every factor measures different aspects. The coefficients indicate which ISQ dimensions have the most influence on overall ISQ of IF. The results of the four regression analyses are presented in Tables 6.2 until 6.5.

Table 6.2 Results Technique & Accommodation, dependent variable overall ISQ of IF

Factors	B	Std. Error	Sig.
Constant	5,472	0,031	0,000
1. Maintenance condition	0,335	0,031	0,000
2. Caretakers & Technicians	0,217	0,031	0,000
3. Safety	0,164	0,031	0,000
4. Security	0,125	0,031	0,000
5. Light at the workplace	0,100	0,031	0,001
6. Accessibility of Isala klinieken	0,059	0,031	0,059

F value = 36,910, *p* < 0,001.
R-squared = 0,346, Adjusted *R*-squared = 0,337.

For Technique & Accommodation all factors are significant and therefore influence the overall ISQ of IF except accessibility of Isala klinieken (p>0,05). This factor therefore does not have a significant contribution to the overall ISQ of IF. The model had an *F* statistic of 36,9 which is significant at the *p* <0,001 level. The R^2 value for this model was 0,346. Therefore the six factors account for 34% of the variation in ISQ of IF. The adjusted R^2, which was 0,337, gives an idea of how well the model

generalizes and ideally the value should be the same or very close to R^2 (Field, 2009). In this case both numbers are very close, therefore the model is able to generalize to the whole population.

Table 6.3 Results Services, dependent variable overall ISQ of IF

Factors	B	Std. Error	Sig.
Constant	5,510	0,025	0,000
1. Service bureau	0,220	0,025	0,000
2. Reception & Telephony	0,102	0,025	0,000
3. Staff restaurant, physical environment & result quality	0,201	0,025	0,000
4. Cleaning	0,245	0,025	0,000
5. Staff restaurant, interaction quality	0,138	0,025	0,000
6. Meeting rooms	0,226	0,025	0,000
7. Bed conditioning	0,119	0,025	0,000
8. Catering	0,158	0,025	0,000

F value = 56,149, $p < 0,001$.
R-squared = 0,469, Adjusted R-squared = 0,461

For Services all factors are significant (p<0,05) which implies that all factors influence the ISQ of IF. The R^2 value for this model was 0,469. Therefore the eight factors account for 47% of the variation in ISQ of IF. The adjusted R^2 had a value of 0,461 which is very close to R^2 of 0,469.

Table 6.4 Results Procurement, dependent variable overall ISQ of IF

Factors	B	Std. Error	Sig.
Constant	5,448	0,038	0,000
1. Procurement	0,425	0,057	0,000
2. Order desk	0,201	0,057	0,000
3. Orders	0,189	0,057	0,001

F value = 26,809, $p < 0,001$.
R-squared = 0,150

For Procurement the factors procurement, order desk and orders influence the ISQ of IF (p<0,05). The R^2 value for this model was 0,150. Therefore the three factors account for 15% of the variation in ISQ of IF. The adjusted R^2 was 0,144 close to the adjusted R^2.

Table 6.5 Results Logistics, dependent variable overall ISQ of IF

Factors	B	Std. Error	Sig.
Constant	5,447	0,035	0,000
1. Reprographic center	0,138	0,034	0,000
2. Linen services, outcome quality	0,183	0,035	0,000
3. Fine distribution	0,218	0,034	0,000
4. Hospital porters	0,198	0,034	0,000
5. Printers & Waste	0,263	0,035	0,000
6. Mail	0,104	0,034	0,002

7. Linen services, interaction quality	0,118	0,034	0,001

F value = 28,182, $p < 0{,}001$.
R-squared = 0,304

All factor for Logistics were significant (p<0,05) indicating they all influence the overall ISQ of IF. The R^2 value for this model was 0,304. Therefore the seven factors account for 30% of the variation in ISQ of IF. The adjusted R^2 has a value of 0,293 close to the R^2 value.

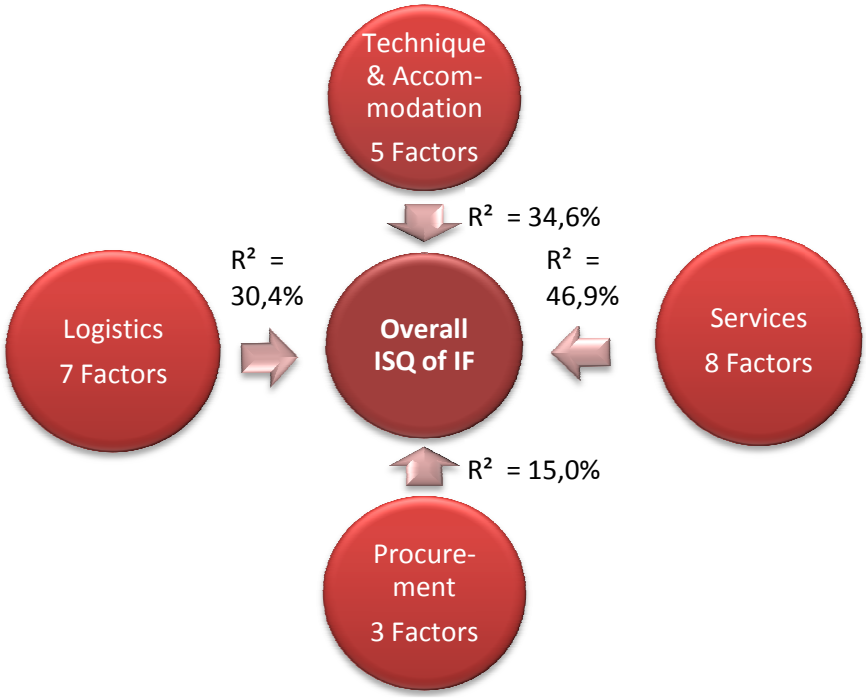


Figure 6.4 ISQ model of IF

In Figure 6.4 the explained amount of variations in ISQ of IF by the four different groups of factors are shown. With an explained variation of 46,9% Services, with 8 factors, contributes the most to the overall ISQ of IF. Procurement contributes, with 15,0% of explained variation through 3 factors, the least to the overall ISQ of IF. The total amount of explained variance exceeds 100% because four PCA and multiple regression analyses were conducted instead of one PCA and one multiple regression analyses for all data (see §6.3 and §6.5).

6.6 Validity & Reliability

To make good assessments of the perceived and expected ISQ, the information provided should be valid and reliable.

6.6.1 External validity and Internal validity

The *external validity* of the results is often under pressure in case studies (Verschuren and Doorewaard, 2010). Since this research focuses on one case the external validity, the ability to make general statements, is limited however by using several sources and methods (questionnaires and interviews) the external validity is maximized. By letting four specialists and one RVE manager review

the questionnaire the *construct validity* is maintained, as statements were refined or added in accordance with their suggestions. With construct validity appropriate operational measures for theoretical concepts being measured are established (Riege, 2003). External validity concerns the extrapolation (generalising) of particular research findings beyond the immediate form of research to the general (Riege, 2003). The generalizability to a broader range than the case study is not justifiable. However the respondents of the questionnaire (with a response rate of 30%) do give a good impression of the total population of Isala klinieken. With an adjusted R-squared close to the R-squared all multiple regression analyses can be generalized to the whole population of Isala klinieken.

All assumptions of normality and linearity are met for every multiple regression analysis which makes it possible to generalize the results to the whole population, accept for the multiple regression analysis for Procurement and Order desk. Since the assumption of normality is violated for Procurement and Order desk we cannot generalize the findings beyond the sample (Field, 2009). Lastly, the results on tactical level are based on two interviewees. This is not a valid amount to represent the whole population, however by choosing two total different type of customers it does gives an indication of the perceived ISQ at tactical level.

Internal validity is the extent to which the structure of the research design enables to draw unambiguous conclusions from the results (De Vaus, 2001). Through using different methods and sources of data the situation of the case study research is represented as good as possible, which benefits the internal validity. The PCA has a good internal validity, as the results delivered distinctionable factors. The internal validity of the influence of several factors on the overall ISQ of IF, which relates to the multiple regression analysis, is questionable. This is caused by the fact that the multiple regression analysis could not be performed over all ISQ factors (from the PCA) of IF together, but only on parts of the factors. Therefore it is difficult to make comparisons of influence of factors and make conclusions of which factors have more or less influence on the overall ISQ of IF.

6.6.2 Reliability

The data from the questionnaire contained some missing values as respondents did not always filled in every question but also because they do not use every service. Questionnaires with many missing values were excluded (see §6.2.1). For the other questionnaires with missing values, the option 'replace with mean value' was chosen to keep the valid answers in the PCA and multiple regression analyses. This means that the missing values are replaced by the average of the variable in question. Since these missing values are replaced with mean values, this can influence the data results of the PCA and regression analysis and thereby the reliability of both analyses.

The results of the PCA were reliable (§5.3). Also the results of the multiple regression analyses were proved to be reliable by comparing the R^2 value and the adjusted R^2 value. All analysis with close values of the R^2 value and the adjusted R^2 value were a reliable result from the whole population.

7. Conclusions & Discussion

The objective of the research was to *develop and test a longitudinal service quality assessment model to measure internal perceived service quality of IF's services by analysing service quality models and dimensions to assess internal service quality by customers and end-users.* Through combining the information from the literature study with the empirical study conclusions are given for the design of the service quality assessment model.

7.1 Conclusions literature study

Relation between internal service quality and customer satisfaction
ISQ is based on the perceived internal service and the expected internal service. It is the extent of the discrepancy between customers' expectations or desires and their perceptions. The perceived internal service is the service that people actually experience. The expected service is the *desired service* what the customer hopes for (a blend of what the customer believes can be offered and should be offered). Customer satisfaction on the other hand is a psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's *prior feeling* about the consumption experience. The ISQ has influences the overall satisfaction of customers just like other factors like product quality, price, situational factors and personal factors.

Measuring (internal) customer expectations and perceived service quality
Active customers can be asked about their perceived and expected ISQ, non-active customers however can only be asked about their expected ISQ. However services are intangible, inseparable of production and consumption; perishable and heterogeneous which should be taken into account when measuring service quality. The characteristics influence how end-users and employees acquire SQ information on which to base on their *expectations* and evidence for their *perceived SQ* evaluation. These aspects of services make ISQ subjective and necessary to measure ISQ from a customer and/or end-user perspective.

ISQ dimensions for hospitals to asses perceived facility service quality on an operational and tactical level
Customers perceive ISQ based on *multiple dimensions* relevant to the context. The multiple dimensions can be divided into interaction quality, physical environment quality and outcome quality. According to literature the multiple dimensions differ between operational and tactical level. The dimensions of 'costs' and 'within budget' which are used at tactical level are not found to be used on operational level. However when the dimensions appropriate on operational and tactical level were reviewed by FM managers and specialists, the dimensions were alike as costs also is used on operational level in the case study organization. The final dimensions appropriate for hospital context after review, applicable for both levels, are:

(1) Reliability (2) Responsiveness (3) Empathy (caring, individualized attention, understanding each other needs), (4) Tangibles (5) Costs (6) Competence (7) Communication, (8) Appearance of department's physical facilities, equipment and personnel, and (9) Accessibility.

Measurement of ISQ of FM services in hospitals in the long run, from a customer and end-user perspective

From literature we can conclude that ISQ should be measured based on the previous described nine dimensions. The dimensions can be operationalized to the different services of hospitals into 102 variables. By measuring the discrepancy between perceived and expected ISQ on these variables, the overall ISQ is measured for different internal services and the overall ISQ of hospitals facility services.

7.2 Conclusions and discussion empirical study

The four departments all contribute more or less with a few or several factors to the overall ISQ of IF. Services contributes the most to the variance in overall ISQ of IF, which may be caused by the fact Services also contains the most amount of factors and the most amount of services. Logistics and Technique & Accommodation have fewer factors and may therefore contribute a little less to the variance of ISQ of IF. Based on these different contributions, when IF wants to improve the overall ISQ, they should first focus on Services, second Technique & Accommodation, third Logistics and fourth Procurement. Procurement only contributed for 15,0% which is much smaller than the other three departments, ranging from 30,4% until 46,9%. This may be caused by the fact that not every employee is allowed make use of Procurement. Since a small group of end-users can make use of the services of Procurement the impact of the services of Procurement on the ISQ of IF perceived by the total respondents is also less. By focusing on these departments and increasing the overall ISQ of IF, the internal customer satisfaction will also increase, provided that all other factors (situational factors, personal factors etc.) remain constant. When the ISQ and internal customer satisfaction increases, this could subsequently have a positive influence on the service quality perceived by external customers (i.e. patients and visitors) and the external customer satisfaction.

Based on the multiple regression analyses 23 significant factors influences the overall ISQ of IF. The factors which we can assume, based on the regression analyses, have the most influence are first procurement, second maintenance condition, third printers & waste, fourth cleaning and fifth fine distribution. It is remarkably that procurement has likely the most influence on overall ISQ of IF, since only a small group of end-user can make use of this service. Apparently procurement does form a very important role for the internal end-users. Furthermore printers & waste is surprisingly also an important factor, since these services are not close to the core process. Perhaps the unusual combination of two services in one factor (i.e. the services printers and waste do not have common aspects) causes together a large influence on the overall ISQ of IF. When improving the ISQ of IF, the different departments of IF should first focus on these five dimensions.

The empirical study consisted of three separate questionnaires due to the high amount of variables, therefore the analysis with results were also done in three parts. The conclusions likewise will also be presented in this lay-out, first services, second procurement and logistics and third technique and accommodation. In order to develop the ISQ of IF, IF should exploit their strengths and improve their weaknesses. The ISQ gap scores per dimension had a broad range. For IF a gap larger than -0,96 indicates a ‘large gap’ since 75% scored below this gap, likewise gaps beneath -0,39 indicates a ‘small gap’ since 75% scored a larger gap. The gap values in-between (-0,39 and -0,96) indicates a ‘neutral gap’, which is not large but not small either for IF. The smaller and larger gaps are evenly distributed across Technique & Accommodation, Services and Logistics which means they

contain some strengths but also some weaknesses. Only, Procurement does not have any outliers, nor strengths nor weaknesses, perhaps respondents think they are doing an average job.

Furthermore, the difference in expectations on dimension level is quite small, which indicates that end-users expect from all services a relatively high service level and do not make a clear distinction between services based on their expectations. The range in perceived service quality is much broader which indicated the perceived service quality within IF per service differs a lot. Clearly, end-users make a distinction between services based on their perceived service quality. The results of the gap analysis of the different dimensions can be used as a guide for facility managers to improve low ISQ dimension with high influence on the overall ISQ of IF and enhance the ISQ of IF

Services

All ISQ gap scores for services were negative, therefore it can be concluded that end-users perceive a low ISQ of services relating to the department Services. The larger gap for cleaning indicates a low ISQ and signals the existence of a deeper underlying problem in the department regarding the service. The underlying problem could be related to cost saving on cleaning, which subsequently relate to low frequency of cleaning and/or an insufficient amount of working hours for housekeepers to fulfill their tasks. As suspected, regression analyses revealed that cleaning is also the most important predictor of the overall ISQ of IF for Services, since the service is close to the core process of a hospital. Secondly, 'meeting rooms' which is also a service close to the core process, is the most important predictor of the ISQ of IF for Services. Thirdly, the 'service bureau' has a the most influence on overall ISQ of IF for Services, which could be caused by the fact the service bureau forms a central point for different services within IF. Clearly, Services should focus on these most important dimensions to improve the overall ISQ of IF. In particular Services should focus on cleaning as cleaning is the most important predictor of the overall ISQ of IF for Services and also contains a large gap. This indicates cleaning has quite a negative influence on the overall ISQ of IF.

At tactical level the ISQ of IF services was quite similar as on operational level. The ISQ was also perceived lower for cleaning which was also stated as important and catering is perceived as a lower ISQ. More positive where the customer on volunteers; reception and physical environment of the staff restaurant.

Procurement and Logistics

Most ISQ gap scores for Procurement and Logistics were negative, therefore it can be concluded that end-users perceive a low ISQ of services relating to the departments Procurement and Logistics. On the overall ISQ of Procurement all gaps can be considered 'neutral', therefore the services of Procurements is perceived quite consistent, no service had a 'large gap' or 'small gap' either. Based on the regression analyses for Procurement, the procurement factor is the most important predictor of ISQ of IF. Procurement should therefore have the main focus on this factor.

Services of Logistics contained 'small gaps' as well as 'large gaps'. The larger gaps for 'linen services, outcome quality' and 'fine distribution' indicates a low ISQ and signals the existence of a deeper underlying problem in the department regarding the service. The larger gap for 'linen services, outcome quality' may be caused by a shortage of proper amount of uniforms (assortment and sizes). For fine distribution the large gap may be caused by a new system (two-bin system) which is recently implemented but not working well with regard to reversing barcodes for replenishment. The large gap of fine distribution may also be caused by an unfavorable time of scanning of stocks

which can cause shortage of stock. Based on regression analyses for Logistics, surprisingly 'printers and waste' is revealed as the most important predictor of overall ISQ for Logistics. It is surprisingly, as stated earlier, since it is less close to the core process of Isala klinieken compared to 'linen services, outcome quality' and 'fine distribution'. Fine distribution is the second most important predictor of overall ISQ of IF for Logistics, which may be because the service is close to the core process of a hospital. 'Hospital porters' is the third most important predictor of the overall ISQ of IF for Logistics, which might be because it is close to the core process of Isala klinieken. The main focus of Logistics should be on these most important dimensions. In particular on 'fine distribution, outcome quality' since it is an important dimension and contains a large gap. This indicates the dimension has quite a negative influence on the overall ISQ of IF.

At tactical level the findings were quite similar to the finding on operational level. The ISQ was also perceived low for linen supply and uniforms and hospital porters. Higher ISQ was perceived for procurement; care takers; technicians; repro center; mail service and printers.

Technique and accommodation

All ISQ gap scores for Procurement and Logistics were negative, therefore it can be concluded that end-users perceive a low ISQ of services relating to Technique and Accommodation. The services contained 'small gaps' as well as 'large gaps'. Especially the 'accessibility of Isala klinieken' is perceived very low, with amount of parking spaces with the lowest variable. This is very remarkable as Isala klinieken has a lot of parking spaces available at a near soccer stadium. The low ISQ has likely to do with the distance end-users have to walk from the parking spaces to their workplace, which is perceived as large. Remarkably, this aspect does not give a significant contribution to the overall ISQ of IF. Apparently end-users do not relate this 'issue' with IF but may perceive it as an issue of Isala klinieken as organization. Another large gap was for 'maintenance condition and appearance', which has to do with a low ISQ of the indoor climate at the workplace and the maintenance condition of interior, furniture as well as the building. The low ISQ could be caused by the fact the current building is quite old. Mid 2013 Isala klinieken will relocate to a new building, therefore probably minimal maintenance was performed in the current building. Light at the workplace had also a large gap, which relates to a low ISQ of daylight in the workplace. The low perceived amount of daylight in the workplace is likely caused by the layout and design of the relative old building. Some offices were placed in the centre of the building, with few opportunities for receiving daylight.

Furthermore, based on the regression analyses, it was remarkable that safety is not the most important predictor for the ISQ of IF for Technique & Accommodation, but first 'maintenance condition', second 'caretakers & technicians' and third 'safety'. We would have expect safety to be the most important predictor for the ISQ of IF for Technique & Accommodation, since it is one of our basic needs. However feeling of safety in the building and at the workplace do have relatively high expectations. Clearly, high expectations in this case does not mean it also contributes the most to the overall ISQ of IF. The three most important predictors of Technique & Accommodation on ISQ of IF, may be caused by the fact maintenance condition is vital to the core process. Caretakers and technicians are necessary to make sure the core process is not interrupted and safety because it is one of our basic needs. The department Technique & Accommodation should focus on these most important dimensions, especially on maintenance conditions. Maintenance condition is the most important predictor of ISQ of IF for Technique & Accommodation and contains also a large gap. Therefore maintenance condition has quite a negative influence on the overall ISQ of IF.

At tactical level the finding were quite similar to the results on operational level. Building; furniture; indoor climate were perceived as low ISQ. However remarkable was that customers do also view security as low ISQ while end-users do not. This could be the case because end-users do not always have to deal with aggressive patients wherefore safety guards should be deployed, while customers do.

Although in literature ISQ dimensions are based on aspects of services (reliability, responsiveness etc.) in practice, it shows that the ISQ dimensions end-users use are mainly based on the entire service (security, servicedesk etc.), sometimes per service a distinction is made between interaction quality, physical environment and outcome quality. We can conclude that end-users assess ISQ of IF based on the 23 ISQ dimensions since accessibility of Isala klinieken can be excluded as it does not have a significant influence on overall ISQ of IF. At tactical level the dimensions volunteers and providing management information can be added. For some services end-users make a distinction between interaction quality, physical environment and outcome quality which was also suggested in literature through Brady and Cronin (2001). A questionnaire based on the 23 factors will provide a valuable measurement tool for IF in measuring the ISQ from an end-user perspective to make ISQ improvements.

No positive scores were found on dimensional level, based on the 23 factors, or on variable level, based on the 102 variables, which could be due to the fact that end-users think there is always room for improvement. When the perceived services equals the desired services, it could mean for end-users the service has an optimal fit.

Services in which empathy plays a higher role, for instance reception and telephony, scored very well. This could be caused by the fact that empathy is also an important aspect of the mission of IF and therefore lately people paid more attention to this aspect of the service.

To conclude, this research has provided insights in how end-users asses ISQ of facility services within a hospital context and it provided insight into the current situation how end-users perceive the services of IF within the Isala klinieken and the overall ISQ of IF.

7.3 Limitations and suggestions for future research

The literature and empirical study contained some limitations which have to be acknowledged; they also revealed some areas of potential future research.

First, the PCA was conducted per survey and could not be conducted over all dimensions regarding all services of IF. In order to do a PCA of all dimensions a survey must be conducted which included all services of IF. Subsequently the multiple regression could not be performed over all components together, but only on parts of the components. This makes it not possible to compare the importance of the factors (*b*-values*)* over the three different surveys.

Second, in the multiple regression analysis we did not control for other variables like age and years of work experience. These variables like age could have an influence on the independent variables and on the dependent variable, the overall ISQ of IF. To exclude the effect of these variables in future analyses the variables as age should be held constant. Future research should study the effects of other variables like age, years of work experience etc. on the independent variables like procurement, cleaning etc and on the effect on overall ISQ of IF.

Third, although the dimensions on operational level are clear at tactical level only qualitative research was performed. Therefore more quantitative research should be performed on the dimensions at tactical level, to verify whether these dimensions are also important for the overall ISQ of IF.

Fourth, this study only focused at the internal customers of IF. To gain a full picture IF should also measure the external service quality of IF services perceived by patients and visitors. External customers may assess the service quality of IF different and may have different opinions about the importance of service dimensions.

Fifth, Isala klinieken is still in transition to a new building, this could influence the results of the assessment. A baseline assessment in the old situation may therefore not be appropriate as it may not give a representative presentation in the difference of ISQ assessment of the ISQ dimensions. For instance, in the new building a 'central service report center' will be introduced. The changing situation can give a repercussion in the perceived quality of employees as they have to get used to the new situation and new procedures. Perhaps a baseline assessment would have more value after the transition to the new building.

To conclude, within the research the cost aspects are not included. Since improving the ISQ will also likely increase the costs. This aspect is not included but does should be taken into consideration when increasing ISQ. More research could be performed on the influence of ISQ on costs.

8. Managerial implications

The literature and empirical study revealed some recommendations for FM practitioners within Isala klinieken. These recommendation will be discussed in the following paragraphs.

8.1 Recommendations for FM practitioners

I) A questionnaire based on 23 ISQ dimensions

A questionnaire based on the 23 factors, i.e. the ISQ dimensions, will provide a valuable measurement tool for IF in measuring the ISQ from an end-user perspective to make ISQ improvements. The measurement tool will assist FM practitioners in understanding how end-users assess the quality of internal services. With the measurement tool specific areas of IF that are in need of attention can be identified. By providing enough space in the questionnaire for suggestions and feedback, the causes of low ISQ can also be revealed.

II) Measurement frequency (annual and continuous measurements)

The perceived and expected ISQ can vary over time, therefore the perceived and expected ISQ should be measured on a yearly basis. Preferably data collection should be performed in October, which is a year after this first baseline assessment. The results should be reported on an annual basis and be published to the facility managers.

It is (internal) customer oriented to carry out the ISQ measurement questionnaire for the multiple departments together. The internal customer will only be asked once to fill in a questionnaire, while when carry out the ISQ questionnaire per department separately, the employees will likely be asked more often. In addition, the departments have the ability to learn from each other.

The interviews should also be performed once a year with customers to give insight which services have improved, or still have to improve.

III) Measurement tool for end-users

As the end-users are already familiar with Parantion and it is used in other departments of Isala klinieken, this system would be an appropriate tool to measure the ISQ. The questionnaire with reminders can easily be spread and data is easily and quick collected.

IV) Performance ISQ Dashboard

The results can be reported in a dashboard style which contains the same approach as a Balanced Scorecard from Kaplan and Norton (1996). A scorecard aims to provide in a simple manner that affords understanding and insight at a glance (Atkin and Brooks, 2010). In this way the results can be easy monitored and the results are manageable for the different service suppliers. This could be done by presenting the average perceived and expected service quality for every service supplier, based on his/her relating ISQ dimensions, on intranet.

V) Key performance indicators

Based on the research results four key performance indicators can be developed, which contribute to the critical success factor of quality improvement. The related key performance indicators are based

on the perceived and expected ISQ of end-users in 2012. In the long-term every department should try to improve the perceived ISQ score to at least equal to or higher than the expected ISQ. In this way ISQ gaps are prevented or at least minimized. The key performance indicators for the short-term are SMART formulated, which means the objectives are Specific, Measurable, Attainable, Relevant and Timely. The norm for 2013 should be estimated based on the perceived and expected ISQ by the service managers since they have more knowledge in order to estimate what is reasonable within the time frame to accomplish. Therefore the norm is shown as a question mark in the following formulated KPI's:

- Improving the ISQ of Services perceived by end-users from 5,40 (perceived ISQ) till ? in 2013. (remark 6,09 is expected ISQ)
- Improving the ISQ of Procurement perceived by end-users from 5.17 (perceived ISQ) till ? in 2013. (remark 5,78 is expected ISQ)
- Improving the ISQ of Logistics perceived by end-users from 5,39 (perceived ISQ) till ? in 2013. (remark 6,04 isexpected ISQ)
- Improving the ISQ of Technique and Accommodation perceived by end-users from 5,11 (perceived ISQ) till ? in 2013. (remark 5,98 isexpected ISQ)

VI) Report improvement points to end-users and customers

To ensure end-users and customers will continue to participate in questionnaires and interviews in the future, feedback should be given to them about what is done with the results. Therefore results and improvement points should be communicated on intranet and/or in a staff magazine (i.e. Pulse).

VII) Cleaning

More research should be performed to find out the causes of low ISQ of cleaning. More research could be performed to find out how much time housekeepers need to appropriately fulfill their tasks. Furthermore, research should be done to find out whether the frequency should be increased and/or the amount of working hours. Subsequently a tradeoff should be made between amount of working hours and the frequency of cleaning.

VIII) Providing insight into number of uniforms

More research should be performed to find out the causes of low ISQ of linen services outcome quality. Besides, the staff of linen services should know exactly how many numbers of which clothing at which sizes are needed, to prevent shortage. With the new clothing machines (KUA-KIA's) in the new building IF can ensure every employee receives an appropriate uniform in their size by preventing hoarding behavior (Dutch hamster gedrag) and providing insight into the demand of uniforms. The hoarding behavior is prevented by giving a maximum of collecting uniforms, for example a maximum of two sets of uniforms.

IX) Responsible two-bin system & research timing of scanning

More research should be performed to find out the causes of low ISQ of fine distribution. When the barcode pictures of stock are not reversed no replenishment takes place. To diminish the amount of mistakes in reversing the barcodes, one person should be set responsible for reversing the barcodes. Nowadays several persons are responsible which is clearly not working well. The supplier could be set responsible or someone of IF.

More research should be performed to find the most suitable moment of scanning and frequency of scanning of consumption for replenishment of the departments. Besides research should be performed to find out the minimum of stock every department requires daily to ensure its operations. Hereby a shortage of stock can be prevented.

X) Financial consequences

For all managerial implication, the increase of ISQ will influence the financial aspects. In the short run costs are likely to increase however on the long-run costs can be decreased. Before improving the ISQ first for every aspect the financial consequences should be made clear. A tradeoff should be made between the expected increased ISQ and costs.

8.2 ISQ Framework

Based on the findings of literature and empiric research, a framework is developed for IF, which in this study is an ISQ measurement model. The model gives an indication how to assess and improve the ISQ of IF. The framework is presented in Figure 8.1. Although the model is a continuous model, the model generates some output which is the ISQ level of customers and end-users of FM services within the hospital. The ISQ level pin-points areas for improvement between the ISQ dimensions. By comparing the output (expected and perceived service) with previous year's trends can be identified and based on gap analyses and suggestions, solutions can be developed to increase low ISQ levels. Besides the expected ISQ level can be translated into ISQ specifications.

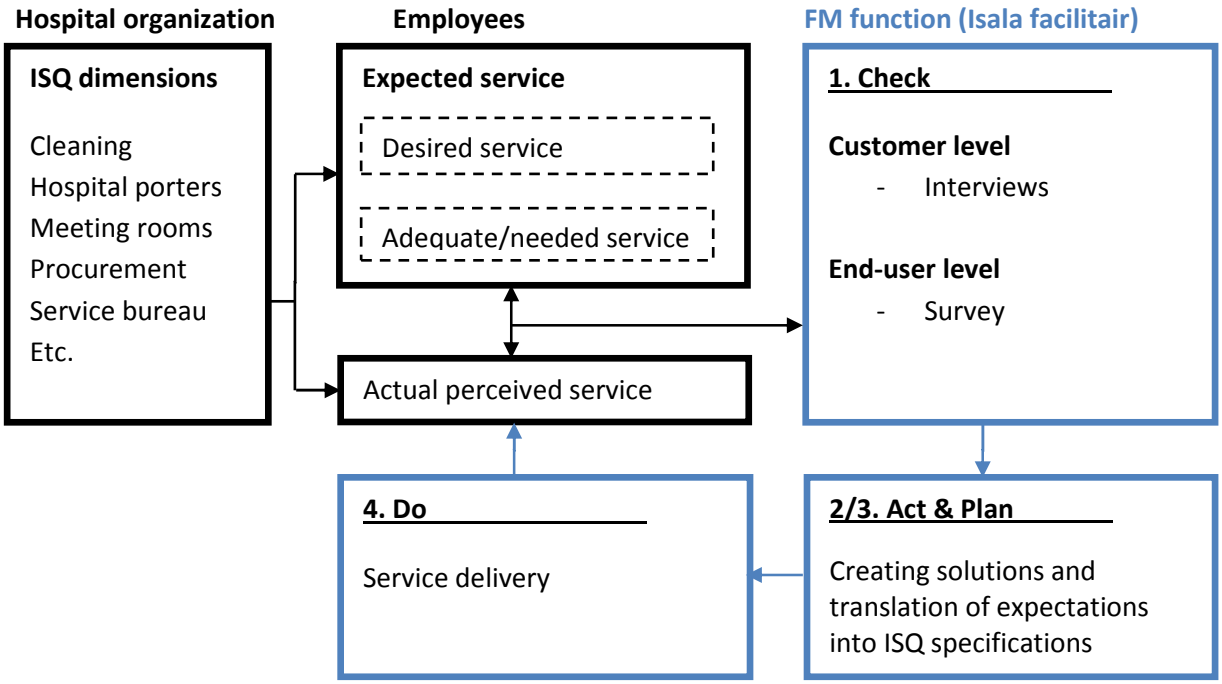


Figure 8.1 ISQ Framework (based on Internal Service Quality Model and PDCA cycle)

References

Ali, K. A. M., Talib, D. and Idris, F. (2009) Mathematical Modeling Of Service Quality Towards Organizational Performance: Case Study On Malaysian Local Authorities. *International Review of Business Research Papers.* Vol. 5 No. 3, pp. 44-57.

Amaratunga, D. And Baldry, D. (2002) Moving from performance measurement to performance management. *Facilities.* Vol. 20 No 5/6, pp. 217-233.

Andaleeb, S.S. (1998) Determinants of customer satisfaction with hospitals: a managerial model. International Journal of Health Care Quality Assurance. Vol. 11 No. 6, pp. 181-187.

Anderson, E.W., Claes, F. and Lehmann, D.R. (1994) Customer satisfaction, market share and profitability: findings from Sweden. *Journal of marketing.* Vol. 58 No. 3, pp. 53-66.

Atkin and Brooks (2010) *Total Facilities Management.* John Wiley & Sons, Oxford.

Azzolini, M. and J. Shillaber (1993) Internal Service Quality: Winning From the Inside Out. *Quality Progress.* Vol. 26 No 11, pp. 75-78.

Babakus, E. And Mangold, W.G. (1992) Adapting the SERVQUAL scale to hospital services: an empirical investigation. *Health Sciences Research.* Vol. 26 No. 2, pp. 767-786.

Bebko, C.P. and Garg, R.K. (1995) Perception of responsiveness in service delivery. *Journal of Hospital Marketing.* Vol. 9 No. 2, pp. 35-45.

Berry, L. L. (1980) Service marketing is different. *Business.* Vol. 30 No. 3, pp. 24-29.

Bitner, M.J. (1992) Servicescapes: The Impact of physical surroundings on customers and employees, *Journal of Marketing*, vol. 56 No. 2, pp. 57 – 71

Bitner, M.J., Booms, B. and Tetreault, M. (1990) The service encounter: diagnosing favourable and unfavourable incidents. *Journal of Marketing.* Vol. 54 No. 1 , pp. 71-84.

Bitner, M.J., Booms, B. And Mohr, L. (1993) *Critical Service Encounters: The employees View.* Working Paper Number 30, First Interstate Centre for Services Marketing. Arizona State University, Tempe, AZ.

Boulding, W., Kalra, A., Staelin, R. and Zeithaml, V.A. (1993) A dynamic process model of service quality: from expectations to behavioral intentions. *Journal of marketing research.* Vol. 30 No. 1, pp. 7-27.

Bolton, R. and Drew J. H. (1991) A multistage model of customers assessments of service quality and value. *Journal of Consumer Research.* Vol. 17 No. 4, pp. 375-384.

Bowers, M.R., Swan, J.E. and Koehler, W.F. (1994) What attributes determine quality and satisfaction with health care delivery? *Health Care Management Review.* Vol. 19 No. 4, pp. 49-55.

Brady M.K. and Cronin, J.J. (2001) Some new thoughts on conceptualizing perceived service quality: a hierarchical approach. *Journal of Marketing.* Vol. 65 No 3, pp. 34-49.

Brogowicz, A.A., Delene, L.M. and Lyth, D.M. (1990) A synthesised service quality model with managerial implications. International Journal of Service Industry Management. Vol. 1 No. 1, pp. 27-45.

Brown, T.J., Gilbert, A. C. and Peter, J. P. (1993) Improving the measurement of service quality. *Journal of retailing.* Vol. 69 No. 1, pp. 127-139.

Carman, J. M. (1990) Consumer perceptions of service quality: an assessment of the SERVQUAL Dimensions. *Journal of Retailing.* Vol. 66 No. 33-55.

Caruana, A. and Pitt, L. (1997) INTQUAL – an internal measure of service quality and the link between service quality and business performance. *European Journal of Marketing.* Vol. 31 No. 8, pp.

604-616.
Chaston, I. (1994) Internal customer management and service gaps within the National Health Service. International Journal of Nursing Studies. Vol. 31 No. 4, pp. 380-390.
Chotipanich, S. (2004) Positioning facility management. *Facilities.* Vol. 22 No. 13, pp. 364-372.
Chung, R.K. (1993) TQM: internal client satisfaction. *Business credit.* Vol. 95 No. 4, pp. 26-39.
Christopher, W. And Les, R. (1999) INTERSERVQUAL: An Investigation of the Dimensions and Measurement of Internal Service Quality in the Hospitality Industry. *Australian Journal of Hospitality Management.* March 22
Clow, K.E., Fischer, A. K. And O'Brian, D. (1995) Patient expectations of dental services. *Journal of Health Care Marketing.* Vol. 15 No. 3, pp. 23-31.
Coddington, D. and Moore, K. (1987) Quality of care as a business strategy: how customers define quality and how to market it. *Healthcare Forum.* Vol. 30 No.2, pp. 29-32.
Cronin, J.J. and Taylor, S.A. (1992) Measuring service quality: a re-examination and extension. *Journal of Marketing.* Vol. 56 No.3, pp. 55-68.
Cronin, J.J. and Taylor, S.A. (1994) SERVPERF versus SERVQUAL: reconciling performance-based *Journal of Marketing.* Vol. 58 No. 1, pp. 125-?
Crosby, L., Evans, K. And Cowles, D. (1990) Relationship quality in services selling: an interpersonal influence perspective. *Journal of Marketing.* Vol. 54 No. 3, pp. 68-81.
Dabholkar, P.A., Sepherd, C.D. and Thorpe, D.I. (2000) A comprehensive framework for service quality: An investigation of critical conceptual and measurement issues through a longitudinal study. Vol. 76 No. 2, pp. 139-173.
Dell'Olio, L., Ibeas, A. and Cecin, P. (2011) The quality of service desired by public transport users. *Transport Policy.* Vol. 18 No. 1, pp. 217-227.
Farner, S., Luthans, F. and Sommer, M. (2001) Managing An empirical assessment of internal customer service. *Service Quality.* Vol. 11 No. 5, pp. 350-358
Ford, R., Bach, S. and Fottler, M. (1997) Methods of measuring patient satisfaction in health care organizations. *Health Care Management Review.* Vol. 22 No. 2, pp. 74-89.
Frost, F.A. and Kumar, M. (2000) INTERSERVQUAL an internal adaptation of the gap model in a large service organisation. *Journal of Service Marketing.* Vol. 14 No. 6, pp. 358-377.
Ghobadian, A., Speller, S. and Jones, M. (1994) Service Quality concepts and models. *International* journal of quality & reliability management. Vol. 11 No. 9, pp. 43-66.
Gilbert, D. and Wong, K.C. (2003) Passenger expectations and airline services: a Hong Kong-based study. *Tourism Management.* Vol. 24, pp. 5190532.
Gotlieb, J.B., Grewal, D. and Brown, S.W. (1994) Consumer satisfaction and perceived quality: complementary
or divergent constructs? *Journal of applied psychology.* Vol. 79 No.6, pp. 875-885.
Gremler, D.D., Bitner, M.J. and Evans, K.R. (1994) The internal service encounter. *International journal of service.* Vol. 5 No. 2, pp. 34-56.
Grönroos, C. (1982) Strategic Management and Marketing in the Service Sector. Helsingfors: Swedisch School of Economics and Business Administration.
Grönroos, C. (1983) Service quality: The six criteria of good perceived service quality. *Review of business.* Vol. 9 No. 4, pp. 1-9.
Grönroos, C. (1989) A service quality model and its marketing implications. *European Journal of Marketing.* Vol. 18 No. 4, pp. 36-44.

Grotenhuis, J.W., Wiegmans, B.W. and Rietveld, P. (2007) The desired quality of integrated multimodal travel information in public transport: customer needs for time and effort savings. *Transport Policy.* Vol. 14 No. 1, pp. 27-38.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006) Multivariate Data Analysis. Upper Saddle River, sixth e.d.

Hart, C.W.L. (1995) The power of internal guarantees. *Harvard Business Review.* Vol. 73 No 1, pp. 64-73.

Hebert, P.R. and Chaney, S. (2012) Using end-user surveys to enhance facilities design and management. *Facilities.* Vol. 30 Nos 11/12, pp. 458-471.

Heskett, J.L. and Schlesinger, L.A. (1994) Putting the service-profit chain to work. *Harvard Business Review.* Vol. 72 No. 2, pp 164-174.

Heus, P. de, Leeden, R. van der, & Gazendam, B. (1995). *Toegepaste data-analyse: Technieken voor niet-experimenteel onderzoek in de sociale wetenschappen.* Lemma, Utrecht.

Hollis, C. (2006) Service quality evaluation in internal healthcare service chains. *Queensland University of Technology.* Faculty of business. Available at: http://eprints.qut.edu.au/16267/1/Charles_Hollis_Thesis.pdf [Accessed on 07/09/12]

Hurley, R.F. and Estelami, H. (1998) Alternative indexes for monitoring customer perceptions of service quality: a comparative evaluation in a retail context. *Journal of the academy of marketing science.* Vol. 26 No. 3, pp. 209-221.

Iacobucci, D., Ostrom , A. and Grayson, K., (1995) Distinguishing service quality and customer satisfaction: the voice of the consumer. *Journal of Consumer Psychology.* Vol. 4 No. 3, pp. 277-303.

Jain, S.K. and Gupta, G. (2004) Measuring Service Quality: SERVQUAL vs. SERVPERF Scales. Vikalpa. Vol. 29 No. 2, pp. 25-37.

Johnston, R. and Heineke, J. (1998) Exploring the relationship between perception and performance: priorities for action. *The Service Industries Journal.* Vol. 18 No. 1, pp. 101-112.

Kang, G., James, J. and Alexandris K (2002) Measurement of internal service quality: application of the SERVQUAL battery to internal service quality. *Managing service quality.* Vol. 12 No. 5, pp. 278-291.

Koska, M.T. (1992) Surveying customer needs, not satisfaction, is crucial to CQI. *Hospitals.* Vol. 66 No. 21, pp. 50-54.

Large, R.O. and König, T. (2008) A gap model of purchasing's internal service quality: concept, case study and internal survey. *Journal of Purchasing & Supply Management.* Vol. 15 No. 1, pp. 24-32.

Lennerts, K., Abel, J. and Pfründer, U. (2005) Step-by-step process analysis for hospital facility management: an insight into the OPIK research project. *Facilities.* Vol. 23 Nos. 3 / 4, pp. 164-175.

Lewis, B.R. and Entwistle, T.W. (1990) Managing the service encounter: a focus on the employee. Managing the service encounter. Vol. 1 No. 3, pp. 41-52.

Lings, I.N. and Brooks, R.F. (1998) Implementing and measuring the effectiveness of internal marketing. Journal of Marketing Management. Vol. 14, pp. 325-351.

Liou, J.J.H. and Tzeng, G. (2007) A non-additive model for evaluating airline service quality. *Journal of Air Transport Management. Vol. 13, pp. 131-138.*

Longo, B. Connor, G. and Barnhart, T. (1993) Using the Critical Incident Survey to Assess Hospital

Service Quality. *Journal of Hospital Marketing.* Vol. 7 No. 2, pp. 91-100.

Lovelock, C.H. and Wirtz, J. (2004) Services marketing. Pearson education International. New York.

Mehrparvar, E., Shahin, A. and Shirouyehzad (2012) Prioritizing internal service quality dimensions using TOPSIS Technique. International Journal of Business and Social Science. Vol. 3 No. 2, pp. 210-217.

Nagel, P. and Cilliers, W. (1990) Customer Satisfaction: a comprehensive approach. *International* Journal of Physical Distribution and Logistics. Vol. 20 No. 6, pp. 2-46.

Neuhaus, P. (1993) Personel customer satisfaction index. Unpublished research report, Catholic University Eichstaett, Ingolstadt, 1993.

Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1985) A conceptual model of service quality and its implications for future research. *Journal of Marketing.* Vol. 49. No. 4, pp. 41-50.

Parasuraman, A. and Grewal, D. (2000) Serving customers and consumers effectively in the twenty-first century: a conceptual framework and overview. *Journal of the academy of marketing science.* Vol. 28 No. 1, pp. 9-16.

Plymire, J. (1990) Internal service: solving problems. *Supervisory Management.* Vol. 35 No. 5, p. 5.

Pullman, M., McGuire, K. and Cleveland, C. (2005) Let me count the words: quantifying open-ended interactions with guests. Cornell Hotel and Restaurant Administration Quarterly. Vol. 46 No. 3, pp. 323-343.

Reimer, A. and Kuehn, R. (2004) The impact of servicescape on quality perception. *European Journal of Marketing.* Vol. 39 Nos 7/8, pp. 785-808.

Reynoso, J. and Moores, B. (1995) Towards the measurement of internal service quality. International journal of service industry management. Vol. 6 No. 3, pp. 64-83.

Riege, A.M. (2003) Validity and reliability tests in case study research: a literature review with 'hands-on' applications for each phase. Qualitative Market Research: An International Journal. Vol. 6 No. 2, pp. 75-86.

Shawn, D. and Haynes, B. (2004) An evaluation of customer perception of FM service delivery. *Facilities.* Vol. 22 Nos 7/8, pp. 170-177.

Sower, V., Duffy, J., Kilbourne, W., Kohers, G. And Jones, P. (2001) The dimensions of service quality for hospitals: development and use of the KQCAH scale. *Health Care Management Review.* Vol. 26 No. 2, pp. 47-59.

Spreng, R.A. MacKenzie, S.B. and Olshavsky R.W. (1996) A re-examination of the determinants of consumer satisfaction. *Journal of marketing.* Vol. 60 No. 3 pp. 15-32.

Stauss, B. (1995) Internal services: classification and quality management. *International Journal of* Service Industry Management. Vol. 6 No. 2, pp. 62-78.

STZ Ziekenhuizen. (n.d.) *Topklinische zorg.* Available at: http://www.stz.nl/pagina/27-topklinische-en-topreferente-zorg.html [Accessed on 16/06/12]

Sulek, J.S. and Hensley, R.L. (2010) Updating service operations. *Managing service quality.* Vol. 20 No. 5, pp 475-489.

Sweeney, D.L. (2008) An integrated model of value equity in spectator sports: conceptual framework and empirical results. A Dissertation submitted to theDepartment of Sport Management,Recreation Management, and Physical Educationin partial fulfillment of therequirements for the degree of Doctor of Philosophy Florida State University College of Education. Available at [http://www.scribd.com/doc/24132204/13/Figure-2-06-Brady-and-Cronin%E2%80%99s-2001-Hierarchical-Model-of-Service-Quality] Accessed on: 11-10-2012.

Taylor, S.A. and Baker, T.L. (1994) An assessment of the relationship between service quality and customer satisfaction in the formation of conusmers'purchase intentions. *Journal of retailing.* Vol. 2 No. 70, pp. 163-178.

Vandamme, R. and Leunis, J. (1992) Development of a multiple-item scale for measuring hospital service quality. International Journal of service industry management. Vol. 4 No. 3, pp. 30-49.

Vandermerwe, S. and Gilbert, D. (1989) Making internal services market driven. *Business Horizons.* Vol. 32 No.6, pp. 83-89.

Vandermerwe, S. and Gilbert, D. (1991) Internal services: gaps in needs/performance and prescriptions for effectiveness. International Journal of Service Industry Management. Vol. 2 No. 1, pp. 5-60.

Verschuren, P. and Doorewaard, H. (2010) *Designing a Research Project*, second edition, The Hague, Eleven International Publishing, second edition.

Wakefield, K. and Blodgett, J. (1999) Customer response to intangible and tangible service factors. Psychology & Marketing. Vol. 16 No .. pp. 51-68

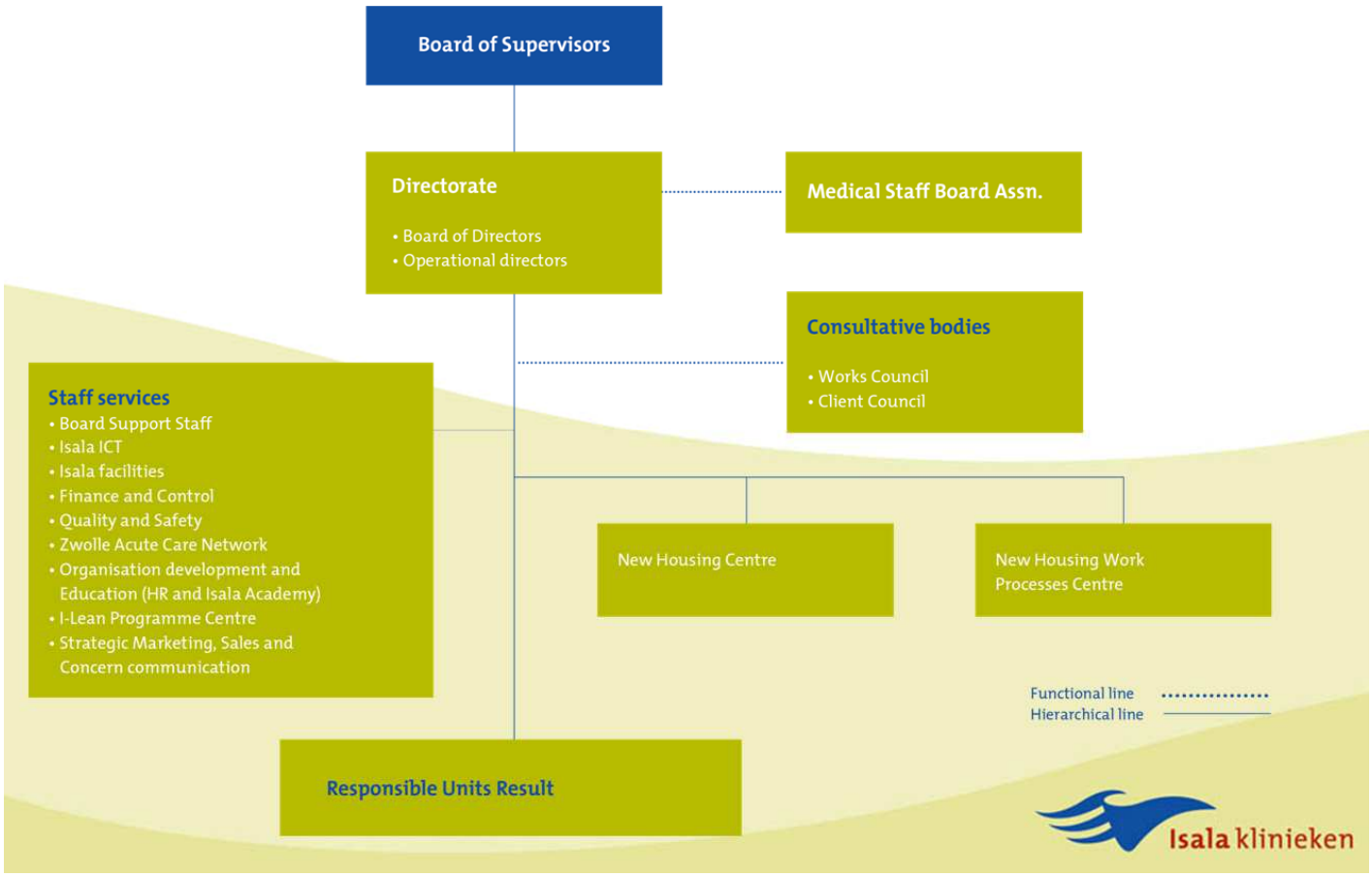
Wilson, A., Zeithaml, V.A., Bitner, M.J. and Gremler, D.D. (2008) Services Marketing: Integrating customer focus across the firm. European ed. McGraw-Hill. Berkshire.

Young, J.A. and Varble, D.L. (1997) Purchasing's performance as seen by its internal customers: A case study in a service organization. International Journal of Purchasing and Material. Vol. 33 No. 3, pp. 36-41.

Zeithaml, V.A., Parasuraman, A. And Berry, L.L. (1990) Delivering quality service: balancing customer perceptions and expectations. The Free Press. New York.

Appendices

Appendix I: Organisation chart Isala klinieken



Responsible Units Result (i.e. RVE, Resultaat Verantwoordelijke Eenheden)

- Anaesthesiology
- Specialist dentistry
- Cardiology
- Surgery
- Gynaecology and obstetrics
- Intensive Care
- Internal medicine
- oral/dental surgery
- Ear, nose, throat surgery
- Paediatrics
- Clinical chemistry
- Clinical pharmacy
- Clinical physics
- Longgeneeskunde
- Gastro-intestinal and liver diseases
- Medical microbiology and infectious diseases
- Medical psychology
- Neonatology
- Neurosurgery
- Neurology
- Nuclear medicine
- Ophtalmology
- Orthopaedics
- Pathology
- Plastic surgery
- Radiology
- Radiotherapy
- Rheumatology
- Rehabilitation medicine
- Emergency Care
- Sports medicine
- Thorax surgery
- Urology

Other organisational units
- Isala Dermatology Centre
- Isala Fertility Centre
- Isala Oncology Centre
- Heerde Outpatient Clinic
- Kampen Outpatient Clinic
- Psychiatry
- Therapy group

Appendix II: Dimensions according to American school

SERVQUAL original dimensions (Parasuraman et al., 1990)

Dimension	Definition
Tangibles	Appearance of physical facilities, equipment, personnel, and communication materials.
Reliability	Ability to perform the promised service dependably and accurately.
Responsiveness	Willingness to help customers and provide prompt service.
Competence	Possession of the required skills and knowledge to perform the service.
Courtesy	Politeness, respect, consideration and friendliness of contact personnel.
Credibility	Trustworthiness, believability, honesty of the service provider.
Security	Freedom from danger, risk, or doubt.
Access	Approachability and ease of contact.
Communication	Keeping customers informed in language they can understand and listening to them.
Understanding the customer	Making the effort to know customers and their needs.

SERVQUAL revised dimensions (Parasuraman et al., 1990)

Dimension	Definition
Tangibles	Appearance of physical facilities, equipment, personnel, and communication materials
Reliability	Ability to perform the promised service dependably and accurately
Assurance	Knowledge and courtesy of employees and their ability to convey trust and confidence
Responsiveness	Willingness to help (internal) customers and provide prompt service.
Empathy	Caring, individualized attention the employees provide to its customers.

Assurance

1. ASS1 Have knowledge to answer questions
2. ASS2 Being consistently courteous
3. ASS3 Instill trust and confidence
4. ASS4 Make employees feel safe

Empathy

5. EMP1 Receiving individual attention
6. EMP2 Dealing with employees caringly
7. EMP3 Understanding employees' needs
8. EMP4 Having employees' interest at heart

Reliability

9. REL1 Providing service as promised
10. REL2 Dependably handling problems
11. REL3 Performing services right, first time
12. REL4 Providing service at promised time
13. REL5 Informing when service will be performed

Responsiveness

14. RES1 Providing prompt service
15. RES2 A readiness to respond
16. RES3 Willingness to help

Tangibles

17. TAN1 Have modern equipment
18. TAN2 Having convenient operating hours
19. TAN3 Visually appealing facilities
20. TAN4 Have a neat professional appearance
21. TAN5 Have clear, easy to read written materials

Appendix III: Dimensions according to Nordic school

External SQ dimensions Brady and Cronin (2001)

Dimension	Items / components
Attitude	"The receptionist seemed very snotty. The nurse and doctor were nice, but the attitude of the receptionist ruined my visit."
	"The attitude and personality of the service personnel definitely influenced my opinion. They were very friendly and warm."
Behaviour	"When I told the waitress that my order was wrong, she apologized and promptly brought over the correct order. Excellent service!"
	"The one incident that stands out in my mind was when some money had fallen out of my pocket.... The workers ran me down to give me my money back."
Expertise	"The first person I spoke with did not seem to know much about what I needed. Even after I had finally selected the tires I wanted, he did not seem to be experienced in entering the data in the computer. My perception of the personnel was directly affected by their lack of knowledge of what they sold."
	"The service personnel really knew their jobs. They were very knowledgeable about the park and knew the answers to all of my questions."
Ambient Conditions	"The office was peaceful and tranquil. It had nice plants all over, and they had beautiful soft music in the background that calmed my nerves a bit."
	"The photo shop was decorated with bright lights and lots of color. This caught my eye and evoked warm, comfortable feelings."
Design (appearance)	"The doctor's office was clean, but people were sitting too close to each other. Germs were spread whenever some-one sneezed or coughed. But the examination rooms were spread out and private, so I felt comfortable talking to the doctor."
	"The photo processing area was located in an inconvenient area. It was at the front of the store where all of the traffic was coming in. This made it hard to organize a line."
Social Factors	"Another factor that influenced my perception of the service surroundings was the volume of business. I equate volume with quality; the more people inside, the higher the quality of the restaurant."
	"lt wasn't a pleasant experience, since everyone there was pretty unhygienic."
Waiting Time	"The amount of time that it took to receive my car was the determining factor of my evaluation of the service outcome, which was a poor one. Even though the car was in great condition, the length of time it took to do it was unreasonable."
	"Overall I didn't like the outcome because it took the doctor only three minutes to check me, and I had to wait three hours just to see him."
Tangibles	"The operation was a success. There were no scars."
	"The quality of the whole park left an impression on me. The food was great, all the rides were clean, and I left with some nice souvenirs."
Valence	"I didn't like the experience because I didn't feel well. I think if I had felt better, I would have had a better time."
	"I would have had more fun if my kids had behaved better. They made it difficult for me to have a good time."

Appendix IV: ISQ dimensions in hospitals

Internal SQ dimensions in hospitals (Reynoso and Moores, 1995)

Dimensions	**Aspects**
Reliability	To perform the internal service right the first time
	To provide the internal service at the required/promised time
	To provide correct/accurate information
	To provide the internal service required promised
	To show sincere interest/effort in solving a problem
	To do something by a certain time
	To provide the internal service at the frequency required
Responsiveness	To give prompt/immediate internal service
	To be willing to co-operate/help/support
	To provide advice/guidance
	To be flexible
Competence	To have the knowledge/skills/experience/training to perform the internal service
	To perform efficiently
	To have the necessary/adequate resources
	To provide the service required to patients
Communication	To communicate plans/progress/problems/changes/needs
	To provide feedback
	To consult decisions
	To listen
	To ask for support
Understanding	To inform/request with enough anticipation
	To put attention/consideration to others' **needs**/problems/limitations
	To understand others' specific needs/problems/limitations
	To have realistic requests/expectations

Appendix V: Operationalization of ISQ dimensions

Service quality	Dimensions	Items / components
Interaction quality	Empathy	- Friendliness of staff. - Willingness to respond to specific needs.
	Competence	- Expertise of the staff. - Expertise of the staff (regarding reservations, referrals, etc.). -Expertise of the staff (regarding requests, error messages, reservations, etc.). - Scanning of inventories for replenishment. - Expertise of the staff (regarding requests, fault messages, reservations, etc.).
	Response	- Speed of processing inquiries or complaints - Helpfulness of staff. - Speed of payment. - Speed of processing inquiries or complaints by surveillance staff. - Speed handling of faults or notifications - Speed processing of inquiries. - Duration of the order (order of application to delivery) - Speed of processing your inquiry or order. - Responsiveness of hospital porters. - Delivery times of mail (mail and packages).
	Communi-cation	- Clear explanation to your question. - Information on the progress of a question, report or failure. - Clarity of explanation about equipment. - Advice with procurement questions. - Information on prices and price changes (clarity, accuracy). - Information on the progress of orders, like delivery times. - Information on the progress of your inquiry or order.
Physical environment quality	Appearance	- Representativeness of the employees. - Interior and size of the restaurant. - Representativeness of meeting spaces. - Representativeness of technicians and caretakers (Dutch huismeesters). - Decoration and furnishing of the building. - Decoration and design of the workplace. - Clarity of the ordering / process. - Loading the articles.
Outcome quality	Tangibles	- Cleaning of the common areas (stairwells, corridors, hall, etc.). - Cleaning of sanitary facilities (toilets etc.). - Cleaning of the work environment. - Cleaning and preparation of the beds. - Repair of the beds. - Quality of products (taste, temperature, freshness) - Range of products. - Quality of coffee and / or tea (taste, temperature). - Quality of hot drinks and other machines (faults, cleaning, refilling)

		- Housekeeping support in the meeting room (resources, order and cleanliness). - Technical support in the meeting room (failures, equipment). - Sense of safety in the area of Isala klinieken. - Sense of safety in the building. - Sense of safety at your workplace. - Condition of the building. - Maintenance condition of the interior. - Maintenance condition of the site. - Signage in and outside the building. - Interior landscaping. - Landscaping around the building - Indoor workplace (temperature, air, etc.). - Daylight in the workplace. - Artificial lighting in the workplace. - Quality of products. - Quality of printing and / or copying. - Waste collection at your workplace. - Waste collection in your building. - Quality of the delivered products (printing and copying). - Cleaning of small linen. - Assortment of small linen. - Cleaning of uniforms. - Assortment of the department - Physical condition at delivery of articles. - Quality furniture (comfort, functionality and ergonomics).
	Reliability	- Correctness handling requests and complaints. - Provision of beds (numbers). - Accuracy fielding questions or messages (e.g. call forwarding / redirect). - Compliance with agreements on security. - Delivering on promises - Physical condition of items ordered - Supplying linen (Dutch platgoed) - Collecting linen (Dutch platgoed) - Supplying the department - On time transportation of patients, patient related products or beds. - Correctness of mail delivery.
	Costs	- Pricing - Price level of articles - Price level of the delivered products

Appendix VI: Topic List Interview RVE Managers

Diensten				
Services	**Inkoop & Logistiek**	**Techniek & Huisvesting**	**Categorieën**	**Aspecten**
Beddencentrale Catering Personeelsrestaurant Receptie Schoonmaak Servicebureau Telefonie Vergaderruimtes Vrijwilligers	*Inkoop:* -Voorraden -Bestellingen *Logistiek:* Afval (reststoffen en gevaarlijke stoffen) Brancardiers Linnenvoorziening (platgoed en dienstkleding) Postverzending Printers Reprografisch centrum Transport (linnen, magazijn- , inkoopgoederen en incidentele goederen)	Beveiliging (surveillance) Gebouw- en terrein gerelateerde voorzieningen Groenvoorziening Huismeesters Technici Veiligheid Verhuizing & Inrichting	Interactie kwaliteit (met de medewerkers)	Bekwaamheid
				Bereikbaarheid
				Communicatie
				Empathie
				Respons
			Fysieke omgevingskwaliteit	Voorkomen
			Uitkomst kwaliteit	Betrouwbaarheid
				Kosten
				Tastbaarheden (uitkomst)

Appendix VII: Questionnaires

7.1 Services

Algemeen

1. Wat is uw geslacht Man / Vrouw
2. Wat is uw leeftijd _____ jaar
3. Hoeveel jaren werkervaring heeft u binnen Isala klinieken? _____ jaren
4. Waar bent u werkzaam binnen Isala klinieken?
   - Polikliniek
   - Verpleegafdeling
   - Intensive Care
   - OK
   - Laboratorium
   - Kantoor
   - Anders
5. Wat is uw functie binnen het ziekenhuis? _____
6. Op welke locatie bent u werkzaam?
   - Locatie Sophia
   - Locatie Weezenlanden
   - Polikliniek Heerde
   - Polikliniek Kampen
   - Diaconessenhuis Meppel
   - Stilobadstraat 3
   - Dr. Spanjaardweg 12 en 29
   - Anders

---

	n.v.t.	Beleefde kwaliteit Score 1/7	Gewenste kwaliteit Score 1/7

Schoonmaak

1. Correctheid afhandeling van verzoeken en klachten.
2. Schoonmaak van de algemene ruimten (trappenhuis, gangen, hal etc.).
3. Schoonmaak van de sanitaire voorzieningen (toiletten e.d.).
4. Schoonmaak van uw directe werkomgeving.

Heeft u suggesties voor schoonmaak?_____

Beddencentrale

Bent u geautoriseerd om bedden te bestellen? Ja / Nee (*Indien nee, naar uitkomst kwaliteit)*

Heeft u het afgelopen jaar te maken gehad met bedden? Ja / Nee (*Indien nee, naar volgend onderwerp)*

5. Levering van bedden (aantallen).
6. Reinigen en opmaak van de bedden.
7. Reparaties van de bedden.

Heeft u nog opmerkingen en/of verbeterpunten voor de beddencentrale?

Receptie & Telefonie

Heeft u het afgelopen jaar gebruik gemaakt van de receptie en/of telefonie? Ja/Nee *(indien nee, naar volgend onderwerp)*

Receptie

8. Vriendelijkheid van de medewerkers.
9. Duidelijke uitleg op uw vraag.
10. Deskundigheid van de medewerkers (m.b.t. reserveringen, doorverwijzingen e.d.).

Telefonie

11. Vriendelijkheid van de medewerkers.
12. Duidelijke uitleg op uw vraag.

Servicebureau

Heeft u het afgelopen jaar gebruik gemaakt van het servicebureau? Ja/Nee *(indien nee, naar volgend onderwerp)*

13. Vriendelijkheid van de medewerkers.
14. Bereidheid om in te gaan op specifieke wensen.
15. Deskundigheid van de medewerkers (m.b.t. aanvragen, storingsmeldingen, reserveringen, e.d.).
16. Telefonische bereikbaarheid.
17. Openingstijden van het servicebureau.
18. Informatie over het verloop van een vraag, melding of storing.
19. Snelheid afhandeling van vragen of klachten.
20. Juistheid afhandelen van vragen of meldingen (bijv. telefonisch doorverbinden / doorverwijzen).

Heeft u suggesties voor de voorgaande diensten?_____

Personeelsrestaurant

Heeft u het afgelopen jaar gegeten in het personeelsrestaurant? Ja / nee *(indien nee, naar volgend onderwerp)*

21. Vriendelijkheid van de medewerkers.
22. Representativiteit van de medewerkers.
23. Behulpzaamheid van de medewerkers.
24. Snelheid van afrekenen.
25. Inrichting en grootte van het restaurant.

26. Kwaliteit van producten (smaak, temperatuur, versheid).
27. Assortiment van producten.
28. Prijsstelling.
29. Openingstijden.

Catering (warme dranken en vending automaten)

Heeft u het afgelopen jaar gebruik gemaakt van de catering? Ja / Nee (*indien nee naar volgend onderwerp)*

30. Kwaliteit van de koffie en/of thee (smaak, temperatuur).
31. Kwaliteit van de warme dranken en overige automaten (storingen, schoonmaak, bijvullen).

Vergaderruimten

Heeft u het afgelopen jaar gebruik gemaakt van vergaderruimten? Ja/Nee (*indien nee, naar volgend onderwerp)*

32. Representativiteit en inrichting van vergaderruimtes.
33. Beschikbaarheid van vergaderruimtes.
34. Huishoudelijke ondersteuning in de vergaderzaal (middelen, orde en netheid).
35. Technische ondersteuning in de vergaderzaal (storingen, apparatuur).

Heeft u suggesties voor de voorgaande diensten?_____

38. Algehele kwaliteit van de Isala Facilitair

1. Welk aspect(en) is/zijn niet meegenomen, die u wel belangrijk vindt voor Services?

   _____

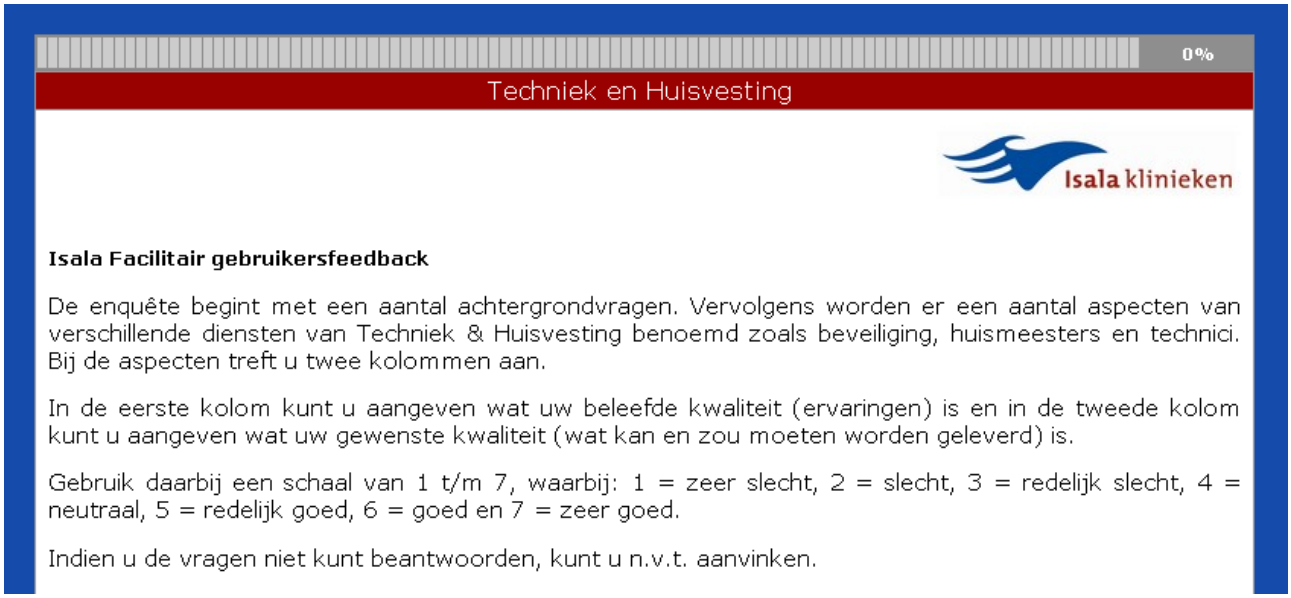
2. Heeft u nog opmerkingen en/of verbeterpunten voor Services?

   _____

3. Wat vond u van de enquête?

   _____

7.2 Techniek en Huisvesting



Algemeen

1. Wat is uw geslacht Man / Vrouw
2. Wat is uw leeftijd _____ jaar
3. Hoeveel jaren werkervaring heeft u binnen Isala klinieken? _____ jaren
4. Waar bent u werkzaam binnen Isala klinieken?
   - Polikliniek
   - Verpleegafdeling
   - OK
   - Intensive Care
   - Laboratorium
   - Kantoor
   - Anders

5. Wat is uw functie binnen het ziekenhuis? _____
6. Op welke locatie bent u werkzaam?
   - Locatie Sophia
   - Locatie Weezenlanden
   - Polikliniek Heerde
   - Polikliniek Kampen
   - Diaconessenhuis Meppel
   - Stilobadstraat 3
   - Dr. Spanjaardweg 12 en 29
   - Anders

	n.v.t.	Beleefde kwaliteit Score 1/7	Gewenste kwaliteit Score 1/7

Beveiliging (surveillance)

Heeft u het afgelopen jaar te maken gehad met de surveillance medewerkers? Ja/Nee *(indien nee, naar volgend onderwerp)*

1. Snelheid afhandeling van vragen of klachten door surveillance medewerkers.
2. Zichtbaarheid van surveillance medewerkers.

Veiligheid

3. Gevoel van veiligheid op het terrein van Isala klinieken.
4. Gevoel van veiligheid in het gebouw.
5. Gevoel van veiligheid op uw werkplek.

Huismeesters (lichte storingen) & Technici (storingen niet medische apparatuur)

Heeft u het afgelopen jaar gebruik gemaakt van de diensten van huismeesters of van technici?
Ja/Nee *(indien nee, naar volgend onderwerp)*

6. Vriendelijkheid van de medewerkers.
7. Bereidheid van medewerkers om in te gaan op specifieke wensen.
8. Duidelijkheid waar storing te melden.
9. Duidelijkheid van uitleg over apparatuur.
10. Snelheid afhandeling van storingen of meldingen.
11. Representativiteit van technici en huismeesters.
12. Correctheid afhandeling van storingen of meldingen.

Heeft u suggesties voor de voorgaande diensten? _____

Gebouw- en terreingerelateerde voorzieningen en groenvoorziening

14. Aankleding en inrichting van het gebouw.
15. Staat van onderhoud van het gebouw.
16. Staat van onderhoud van het interieur.
17. Staat van onderhoud van het terrein.

Overige

18. Bewegwijzering in en buiten het gebouw.
19. Aantal plaatsen in de fietsenstalling.
20. Aantal parkeervoorzieningen voor auto's.
21. Interieurbeplanting.
22. Groenvoorziening rondom het gebouw.

Werkplek

23. Kwaliteit meubilair (comfort, functionaliteit en ergonomie).
24. Binnenklimaat op de werkplek (temperatuur, lucht e.d.).
25. Daglicht op de werkplek.
26. Kunstlicht op de werkplek.
27. Aankleding en inrichting van de werkplek.

28. Algehele kwaliteit van de Isala Facilitair

1. Welk aspect(en) is/zijn niet meegenomen, die u wel belangrijk vindt voor Techniek en Huisvesting?

2. Heeft u nog opmerkingen en/of verbeterpunten voor Techniek en Huisvesting ?

3. Wat vond u van de enquête?

7.3 Inkoop en Logistiek

Algemeen

1. Wat is uw geslacht Man / Vrouw
2. Wat is uw leeftijd _____ jaar
3. Hoeveel jaren werkervaring heeft u binnen Isala klinieken? _____ Jaren
4. Waar bent u werkzaam binnen Isala klinieken?
   - Polikliniek
   - Verpleegafdeling
   - OK
   - Intensive Care
   - Laboratorium
   - Kantoor
   - Anders
5. Wat is uw functie binnen het ziekenhuis? _____
6. Op welke locatie bent u werkzaam?
   - Locatie Sophia
   - Locatie Weezenlanden
   - Polikliniek Heerde
   - Polikliniek Kampen
   - Diaconessenhuis Meppel
   - Stilobadstraat 3
   - Dr. Spanjaardweg 12 en 29
   - Anders
7. Bent u geautoriseerd om in te kopen? Ja / Nee

---

	n.v.t.	**Beleefde kwaliteit Score 1/7**	**Gewenste kwaliteit Score 1/7**

Inkoop

Heeft u het afgelopen jaar gebruik gemaakt van de diensten van Inkoop? Ja/Nee *(indien nee, naar volgend onderwerp)*

1. Vriendelijkheid van de medewerkers.
2. De bereidheid in te gaan op specifieke wensen.
3. Deskundigheid van de medewerkers.
4. Behulpzaamheid van de medewerkers.

5. Advies bij inkoopvragen.
6. Informatie over prijzen en prijswijzigingen (duidelijkheid, correctheid).
7. Nakomen van afspraken.
8. Kwaliteit van de producten.

Heeft u nog opmerkingen en/of verbeterpunten voor Inkoop?

_____

Welk aspect(en) is/zijn niet meegenomen, die u wel belangrijk vindt voor Inkoop?

_____

Bestelbureau

9. Vriendelijkheid van de medewerkers.
10. Informatie over het verloop van bestellingen zoals levertijden.
11. Doorlooptijd van de bestelling (van bestelaanvraag tot levering).
12. Bereikbaarheid van het bestelbureau.
13. Duidelijkheid van het bestelsysteem/proces.
14. Fysieke conditie van bestelde artikelen.
15. Prijsniveau van artikelen.

Heeft u nog opmerkingen en/of verbeterpunten voor het bestelbureau?

_____

Welk aspect(en) is/zijn niet meegenomen, die u wel belangrijk vindt voor het bestelbureau?

_____

Logistiek

	n.v.t.	**Beleefde kwaliteit Score 1/7**	**Gewenste kwaliteit Score 1/7**

Printers

16. Kwaliteit van de print en/of kopieerwerk.
17. Bereikbaarheid en beschikbaarheid van printers/multifunctionals in uw gebouw.

Afval (reststoffen en gevaarlijke stoffen)

18. Afvalinzameling op uw werkplek.
19. Afvalinzameling in uw gebouw.

Reprografisch centrum (centraal)

Heeft u het afgelopen jaar gebruik gemaakt van het reprografisch centrum? Ja/Nee *(indien nee, naar volgend onderwerp)*

20. Deskundigheid van de medewerkers.
21. Informatie over het verloop van uw vraag of bestelling.
22. Snelheid afhandeling van uw vraag of bestelling.
23. Kwaliteit van de geleverde producten (drukwerk en kopieerwerk).
24. Prijsniveau van de geleverde producten.

Linnenkamer (Platgoed en Dienstkleding)

Heeft u het afgelopen jaar gebruik gemaakt van de diensten van de linnenkamer? Ja / nee

25. Vriendelijkheid van de medewerkers.
26. Telefonische bereikbaarheid van de linnenkamer.

Platgoed (washandjes, handdoeken, luiers, rompertjes en ander klein linnengoed)

Heeft u het afgelopen jaar gebruik gemaakt van platgoed en of dienstkleding? Ja/Nee (indien nee, naar volgend onderwerp)

27. Reiniging van platgoed.
28. Assortiment van platgoed.
29. Bevoorrading van platgoed.
30. Ophalen gebruikt platgoed.
31. Reiniging van dienstkleding.

Fijn distributie

Heeft u het afgelopen jaar te maken gehad met fijn distributie (bevoorrading van de afdeling)?

32. Het scannen van voorraden voor aanvulling.
33. Assortiment van de afdeling.
34. Bevoorrading van de afdeling.
35. Inruimen van artikelen.
36. Fysieke conditie bij aflevering van artikelen.

Brancardiers

Heeft u het afgelopen jaar gebruik gemaakt van brancardiers? Ja/Nee *(indien nee, naar volgend onderwerp)*

37. Reactiesnelheid van brancardiers.
38. Beschikbaarheid van brancardiers.
39. Op tijd vervoeren van patiënten, patiëntgebonden producten of bedden.

Postverzending

Heeft u het afgelopen jaar gebruik gemaakt van de dienst 'postverzending' ? Ja/Nee *(indien nee, naar volgend onderwerp)*

40. Juistheid levering van post.
41. Levertijden van poststukken (post en pakketten).

42. Algehele kwaliteit van de Isala Facilitair

1. Welk aspect(en) is/zijn niet meegenomen, die u wel belangrijk vindt voor Logistiek?

   _____

2. Heeft u nog opmerkingen en/of verbeterpunten voor Logistiek?

   _____

3. Wat vond u van de enquête?

   _____

Appendix VIII: Detailed information on respondents

In the following tables the frequencies are displayed on the personal characteristics of the respondents. The characteristics are: location, department, function, duration employment, age and sex.

	Services	Inkoop & Logistiek	Techniek en Huisvesting	Total
Location Op welke locatie bent u werkzaam? (meerdere antwoorden mogelijk)				
Sophia	294	327	257	878
Weezenlanden	269	201	204	674
Polikliniek Heerde	8	4	3	15
Polikliniek Kampen	10	16	11	37
Diaconessenhuis Meppel	3	4	5	12
Stilobadstraat 3	14	3	14	31
Dr. Spanjaardweg 12 of 29	37	38	58	133
Different	8	5	12	25
Department Waar bent u werkzaam binnen Isala klinieken? (meerdere antwoorden mogelijk)				
Policlinic	133	106	113	352
Nursing department	177	158	150	485
Intensive Care	29	32	30	91
OR	28	44	22	94
Laboratory	34	29	24	87
Office	64	35	67	166
Different	82	98	85	265
Function Wat is uw functie binnen het ziekenhuis?				
Nurse	167	183	114	464
Medical specialist & assistent	64	70	117	251
Medical support	65	62	45	172
Administrative	139	94	99	332
Service assistent	30	23	33	86
Others (OL en andere)	44	40	15	99
Total	509	472	423	1404
Missing	4	7	11	22
Duration Employment Hoeveel jaren werkervaring heeft u binnen Isala klinieken?				
<10	230	8	406	644
11-20	265	156	9	430
21-30	13	213	13	239
31-40	5	93	6	104
>41	0	8	0	8
Missing	0	1	0	1
Total	513	479	434	1426
Age Wat is uw leeftijd?				
<35	176	9	225	410

36-45	154	127	108	389
46-55	132	239	83	454
>56	51	102	17	170
Missing	0	2	1	3
Total	513	479	434	1426
Sex Wat is uw geslacht?				
Man	57	74	71	202
Woman	456	405	363	1225
Total	513	479	434	1426

	Overall ISQ of Isala Facilitair						Total
	2	3	4	5	6	7	
Overall score ISQ of IF per location							
Sophia	3	11	75	295	437	38	859
Weezenlanden	4	12	51	223	346	25	661
Polikliniek Heerde)	1	0	0	5	8	1	15
Polikliniek Kampen	1	0	4	13	19	0	37
Diaconessenhuis Meppel	1	0	0	3	7	1	12
Stilobadstraat 3	1	0	0	12	14	0	27
Dr. Spanjaardweg 12 of 29	2	1	10	32	77	8	130
Others	0	0	4	8	12	0	24
Overall score ISQ of IF per department							
Policlinic	0	5	24	111	184	22	346
Nursing department	2	10	46	179	230	14	481
Intensive Care	0	1	7	29	51	3	91
OR	0	2	9	36	41	1	89
Laboratory	1	0	6	29	40	3	79
Office	0	3	14	48	88	10	163
Different	4	3	15	82	141	13	258
Overall score ISQ of IF per function							
Nurse	1	9	48	152	239	7	456
Medical specialist & assistent	1	5	19	84	120	14	243
Medical support (lab, analist, csh etc.)	2	1	12	51	92	8	166
Administrative	1	5	22	102	171	22	323
Service assistent	1	0	6	34	37	7	85
Others (OI, managers etc.)	0	2	4	39	46	7	98
Total	6	22	111	462	705	65	1371
Overall score ISQ of IF per years of deployment							
<10	1	10	55	216	329	23	634
11-20	1	4	27	144	224	23	423
21-30	2	5	25	78	108	11	229
31-40	2	3	7	31	48	8	99
>41	0	0	1	1	5	0	7
Missing	0	0	1	0	0	0	1
Total	6	22	116	470	714	65	1393

Appendix IX: Principal Component Analysis

9.1 Services

Rotated Component Matrix

Component	Component loading
Component 1 Service bureau (eigenvalue 8,83, explained variance 14,34%)	
Friendliness of staff.	,749
Willingness to respond to specific needs.	,824
Expertise of the staff (regarding reservations, referrals, etc.).	,833
Accessibility by Telephone.	,712
Opening hours of service bureau.	,482
Information on the progress of a question, report or failure.	,763
Speed of processing inquiries or complaints.	,796
Correctness handling requests and complaints.	,734
Component 2 Reception & Telephony (eigenvalue 3,20, explained variance 10,60%)	
Friendliness of staff.	,814
Clear explanation to your question.	,847
Expertise of the staff (regarding reservations, referrals, etc.).	,770
Friendliness of staff.	,829
Clear explanation to your question.	,817
Component 3 Staff restaurant physical environment and outcome quality (eigenvalue 2,77, explained variance 8,45%)	
Interior and size of the restaurant.	,549
Quality of products (taste, temperature, freshness).	,718
Range of products.	,784
Prices.	,779
Opening hours.	,537
Component 4 Cleaning (eigenvalue 2,20, explained variance 7,49%)	
Correctness handling requests and complaints.	,688
Cleaning of the common areas (stairwells, corridors, hall, etc.).	,744
Cleaning of sanitary facilities (toilets etc.).	,825

Cleaning of the work environment.	,811
Component 5 Staff restaurant interaction quality (eigenvalue 1,80, explained variance 7,32%)	
Friendliness of staff.	,834
Representativeness of staff.	,766
Helpfulness of staff.	,848
Speed of payment.	,466
Component 6 Meeting rooms (Eigenvalue 1,57, explained variance 6,85%)	
Representativeness of meeting rooms.	,717
Availability of meeting rooms.	,672
Housekeeping support in the meeting room (resources, order and cleanliness).	,760
Technical support in the meeting room (failures, equipment).	,759
Component 7 Bed conditioning (eigenvalue 1,30, explained variance 5,68%)	
Provision of beds (numbers).	,805
Cleaning and preparation of the beds.	,781
Repair of the beds.	,760
Component 8 Catering (eigenvalue 1,19, explained variance 4,61%)	
Quality of coffee and / or tea (taste, temperature).	,848
Quality of hot drinks and other machines (faults, cleaning, refilling).	,837

9.2 Technique and accommodation

Rotated Component Matrix

Component	Component loading
Component 1 Maintenance condition & appearance (eigenvalue 7,04, explained variance 19,58%)	
Decoration and furnishing of the building.	,781
Condition of the building.	,786
Maintenance condition of the interior.	,839
Maintenance condition of the site.	,554
Interior landscaping.	,729
Landscaping around the building.	,593
Quality furniture (comfort, functionality and ergonomics).	,755
Indoor climate (temperature, air, etc.).	,592
Decoration and design of the workplace.	,760
Component 2 Caretakers and Technicians (eigenvalue 3,42, explained variance 15,11%)	
Friendliness of staff.	,761
Willingness to respond to specific needs.	,822
Clarity where to report failures.	,585
Clarity of explanation about equipment.	,582
Speed handling of faults or notifications.	,753
Representativeness of technicians and caretakers.	,761
Correctness handling requests and failures.	,829
Component 3 Safety (eigenvalue 1,99, explained variance 8,59%)	
Feeling of safety in the area of Isala klinieken.	,760
Feeling of safety in the building.	,891
Sense of safety at your workplace.	,809
Component 4 Security (eigenvalue 1,43, explained variance 6,47%)	
Speed of processing inquiries or complaints by surveillance staff.	,872
Visibility of surveillance staff.	,895
Component 5 Light at the workplace (eigenvalue 1,25, explained variance 6,36%)	
Daylight in the workplace.	,847
Artificial lighting in the workplace	,772
Component 6 Accessibility of Isala klinieken (eigenvalue 1,06, explained variance 6,13%)	
Signage in and outside the building.	,548
Number of places in the bicycle shed.	,663

Number of parking spaces for cars.	,664

9.3 Procurement and Order desk

Rotated Component Matrix

Component	Component loading
Component 1 Procurement (eigenvalue 6,29, explained variance 34,01%)	
Friendliness of staff.	,797
Willingness to respond to specific needs.	,848
Expertise of the staff.	,842
Helpfulness of staff.	,855
Advice with procurement questions.	,836
Information on prices and price changes (clarity, accuracy).	,612
Delivering on promises	,757
Quality of products	,691
Component 2 Orderdesk (eigenvalue 2,43, explained variance 16,04%)	
Friendliness of staff.	,837
Information on the progress of orders, like delivery times.	,633
Accessibility of oderdesk.	,809
Component 3 Orders **(eigenvalue 1,11,** explained variance15,43%)	
Duration of the order (order of application to delivery).	,593
Clarity of the ordering / process.	,681
Physical condition of items ordered	,859
Price level of items.	,639

9.4 Logistics

Rotated Component Matrix

Component	Component loading
Component 1 Reprografic center (eigenvalue 5,83, explained variance 12,80%)	
Expertise of the staff.	,882
Information on the progress of your inquiry or order.	,862
Speed of processing your inquiry or order.	,770
Quality of the delivered products (printing and copying).	,832
Price level of the delivered products.	,572
Component 2 Linen services outcome quality (eigenvalue 3,18, explained variance 11,60%)	

Cleaning of uniforms.	,448
Cleaning of small linen (platgoed).	,799
Assortiment of small linen (platgoed).	,799
Supply of small linen (platgoed).	,833
Collecting small linen (platgoed)	,701
Component 3 Fine distribution (eigenvalue 2,27, explained variance 11,34%)	
Scanning of inventories for replenishment.	,820
Assortment of the department	,687
Supplying the department	,855
Loading the articles.	,747
Physical condition at delivery of articles.	,584
Component 4 Hospital porters (eigenvalue 1,95, explained variance 9,55)	
Responsiveness of hospital porters.	,878
Availability of hospital porters.	,901
On time transportation of patients, patient related products or beds.	,858
Component 5 Printers & Waste (eigenvalue 1,69, explained variance 8,73%)	
Quality of printing and / or copying.	,616
Accessibility and availability of printers / multifunction devices in your building.	,611
Waste collection at your workplace.	,786
Waste collection in your building.	,805
Component 6 Mail (eigenvalue 1,27, explained variance 6,64%)	
Correctness of mail delivery.	,880
Delivery times of mail (mail and packages).	,862
Component 7 Linen services interaction quality (eigenvalue 1,21, explained variance 6,29%)	
Friendliness of staff.	,815
Accessibility by telephone of linen services	,828

Appendix X: Paired sample t-test

10.1 Paired sample t-test of six smallest dimension on variable level

Variables	Mean	Standard deviation	t	df	Sig. (2-tailed)
Reprografic center					
Expertise of the staff.	-,225	,668	-4,487	177	,000
Information on the progress of your inquiry or order.	-,241	,704	-4,520	173	,000
Speed of processing your inquiry or order.	-,057	,477	-1,588	173	,114
Quality of the delivered products (printing and copying).	-,200	,597	-4,432	174	,000
Price level of the delivered products.	-,195	,588	-3,598	117	,000
Reception & Telephony					
Friendliness of staff.	-,327	,672	-9,805	406	,000
Clear explanation to your question.	-,250	,522	-9,337	379	,000
Expertise of the staff (regarding reservations, referrals, etc.).	-,304	,639	-9,135	367	,000
Friendliness of staff.	-,301	,666	-9,101	404	,000
Clear explanation to your question.	-,263	,578	-8,780	372	,000
Security					
Speed of processing inquiries or complaints by surveillance staff.	-,127	,992	-1,298	101	,197
Visibility of surveillance staff	-,451	,954	-5,028	112	,000
Mail					
Correctness of mail delivery.	-,322	,772	-6,535	244	,000
Delivery times of mail (mail and packages).	-,381	,878	-6,400	217	,000
Servicebureau					
Friendliness of staff.	-,202	,590	-6,471	355	,000
Willingness to respond to specific needs.	-,243	,680	-6,532	332	,000
Expertise of the staff (regarding reservations, referrals, etc.).	-,295	,683	-7,994	341	,000
Accessibility by telephone	-,323	,696	-8,563	340	,000
Opening hours of servicebureau.	-,893	1,198	-13,688	336	,000
Information on the progress of a question, report or failure.	-,431	,835	-9,097	310	,000
Speed of processing inquiries or complaints	-,386	,776	-8,873	318	,000
Correctness handling requests and complaints.	-,227	,555	-7,348	320	,000
Caretakers & Technicians					
Friendliness of staff.	-,176	,630	-4,467	255	000
Willingness to respond to specific needs.	-,258	,749	-5,345	239	,000
Clarity where to report failures.	-,606	1,004	-9,466	245	,000
Clarity of explanation about equipment.	-,435	,821	-7,187	183	,000
Speed handling of faults or notifications.	-,618	1,076	-9,095	250	,000
Representativeness of technicians and caretakers	-,244	,686	-5,575	245	,000
Correctness handling requests and failures.	-,296	,747	-6,309	252	,000

10.2 Paired sample t-test of six largest dimension on variable level

Variables	Mean	Standard deviation	t	df	Sig. (2-tailed)
Accessibility Isala klinieken					
Signage in and outside the building.	-1,195	1,425	-16,983	409	,000
Number of places in the bicycle shed.	-1,421	1,582	-15,035	279	,000
Number of parking spaces for cars.	-2,394	1,996	-23,094	370	,000
Maintenance condition and appearance					
Decoration and furnishing of the building.	-1,558	1,429	-22,371	420	,000
Condition of the building.	-1,797	1,536	-23,916	417	,000
Maintenance condition of the interior	-1,734	1,583	-22,395	417	,000
Maintenance condition of the site.	-,914	1,131	-16,595	420	,000
Interior landscaping.	-1,235	1,507	-15,851	373	,000
Landscaping around the building	-,814	1,214	-13,539	407	,000
Quality furniture (comfort, functionality and ergonomics).	-1,694	1,648	-21,010	417	,000
Indoor climate (temperature, air, etc.).	-2,019	1,780	-23,301	421	,000
Decoration and design of the workplace.	-1,381	1,452	-19,495	419	,000
Cleaning					
Correctness handling requests and complaints.	-0,809	1,283	-12,883	417	,000
Cleaning of the common areas (stairwells, corridors, hall, etc.).	-1,278	1,419	-20,143	499	,000
Cleaning of sanitary facilities (toilets etc.).	-1,677	1,686	-22,228	498	,000
Cleaning of the work environment.	-1,511	1,618	-20,901	500	,000
Fine distribution					
Scanning of inventories for replenishment.	-1,420	1,475	-13,618	199	,000
Assortment of the department	-,826	1,150	-10,483	212	,000
Supplying the department	-1,698	1,690	-14,728	214	,000
Loading the articles.	-,995	1,405	-10,088	202	,000
Physical condition at delivery of articles.	-,363	,789	-6,526	200	,000
Linen services outcome quality					
Cleaning of uniforms.	-1,762	1,694	-16,768	259	,000
Reiniging van platgoed.	-1,052	1,371	-11,174	211	,000
Assortiment van platgoed.	-,663	1,020	-9,244	201	,000
Cleaning of small linen (Dutch platgoed).	-,813	1,208	-9,731	208	,000
Collecting small linen (Dutch platgoed)	-,676	1,158	-7,939	184	,000
Light at the workplace					
Daylight in the workplace.	-1,137	1,593	-14,557	415	,000
Artificial lighting in the workplace	-,867	1,227	-14,265	406	,000