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Evaluating customer service quality in manufacturer-distributor settings

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Abstract

The objective of this thesis is to create and subsequently empirically test a service quality measurement model suitable for situations where the relationships between a manufacturing and a distribution organization. Service quality is commonly identified as a key success factor but the majority of existing quality models are developed for b2c settings and are not suitable for measuring the service quality in a b2b relationship.

Based on previous research on the field of service quality measurement, a quality model was developed. This model includes hypothesized service quality dimensions, which represent different aspects of service quality. The model suggests that input dimensions positively affect the process dimensions, which subsequently have a positive effect on output quality. These dimensions were Tangibles & visuals, Information, Employee assurance, Accessibility, Service delivery, Employee response, Service outcome quality and Customer value. Concurrently with the quality constructs, a set of indicators was developed in order to measure these latent quality constructs.

Quantitative empirical research was carried out in order to test the hypothesized model. Data was collected from the case company's distributors via a survey that comprised of the above-mentioned indicators and a total of 55 usable datasets were received. The data was analyzed using Partial Least Squares (PLS) method. The developed model predicted 63% - 76% of the process and outcome dimensions of service quality, depending on the dimension. Reliability and validity of the model was confirmed and all the above-mentioned hypothesized positive relationships were supported.

Study findings support the widespread idea that service quality has both a process and an outcome structure that contribute to the overall perceived service quality. The findings also show that providing sufficient accessibility and assurance from employees contribute most strongly to process dimension. Furthermore, Employee response is the strongest predictor of output quality. Suggestions for future research include a refined model of the one introduced in this study that would utilize the Gap-approach.

Keywords Service quality measurement, Service quality model, Partial Least Squares

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Tiivistelmä

Asiakaspalvelun laatu on yleisesti tunnistettu yritysten keskeiseksi kilpailutekijäksi, mutta laadun mittaukseen käytettävät menetelmät ovat olleet pääasiallisesti kuluttajapuolen sovellutuksia. Tämän tutkimuksen tavoitteena on luoda ja empiirisesti testata mittausmalli, joka soveltuu organisaatioidenvälisen asiakaspalvelun laadun arviointiin.

B2b-kontekstiin soveltuva laatumalli kehitettiin aiemman alan tutkimuksen pohjalta. Mallin muodostavat asiakaspalvelun laadun eri dimensiot, jotka yhdessä muodostavat laatukokonaisuuden. Mallissa dimensiot jaetaan panos-dimensioihin, prosessi-dimensioihin ja tuotos-dimensioihin. Tutkimushypoteesit esittävät, että panos-dimensioilla on positiivinen vaikutus prosessi-dimensioihin, joilla vuorostaan on positiivinen vaikutus tuotos-dimensioihin. Nämä eri laatudimensiot ovat Tangibles & visuals, Information, Employee assurance, Accessibility, Service delivery, Employee response, Service outcome quality ja Customer value. Samanaikaisesti kehitettiin myös em. ulottuvuuksia peilaava mittaristo.

Tutkimusmallia testattiin kvantitatiivisen analyysin avulla. Data kerättiin case-yrityksen jakelijoilta kyselytutkimuksella, joka koostui em. mittaristosta. Kyselyn avulla kerätty 55 kappaleen otos analysoitiin käyttäen PLS-rakenneyhtälömetodia. Analyysissä saavutettiin 63% - 76% selitysasteet prosessi- ja tuotos-dimensioissa. Mallin luotettavuus ja validiteetti todettiin hyviksi ja tulokset tukivat kaikkia em. tutkimushypoteeseja.

Tulokset tukivat osaltaan ajatusta siitä, että palvelun laatu voidaan käsittää rakenteena jossa on sekä prosessi- että tuotos-ulottuvuus, ja jotka molemmat osaltaan vaikuttavat laatuun kokonaisuutena. Tulokset viittaavat siihen, että palveluprosessin laadun tärkeimmät vaikuttimet ovat työntekijöiden suhtautumisen lisäksi asiakaskontaktien tiheys ja se kuinka joustavasti asiakkailla on mahdollisuus olla yhteydessä palveluhenkilöstöön. Prosessi-dimensioiden vaikutus tuotos-ulottuvuuteen korostuu Employee assurance –dimensiossa, mikä viittaa työntekijöiden toiminnan ratkaisevaan merkitykseen. Tämä tukee osaltaan huomiota työntekijöiden suhtautumisen merkityksestä. Tulevan tutkimuksen kohteeksi ehdotetaan tässä työssä esitetyn mallin soveltamista Gap-lähestymistapaan, jossa palvelun laadun ajatellaan muodostuvan mielletyn lopputuloksen ja odotusten välisenä erotuksena.

Avainsanat Asiakaspalvelun laatu, rakenneyhtälömalli, laadun mittaus

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1. INTRODUCTION

This thesis aims at providing and testing a measurement tool that is a good fit for situations where the quality of customer service in a manufacturer-distributor relationship is assessed. A new service quality measurement model is defined using material from previous studies in the field and it will be subjected to testing using quantitative analysis and data from a case company. The company's business model offers a good backdrop for testing the tool developed in this thesis because it is a typical example of the manufacturer-distributor setting that is in the center of this study. The empirical data will be collected using a survey-based approach and the data will be analyzed using appropriate data analysis software. The background of the study, research problem and objectives are covered in more detail in the following sections.

1.1. Background of the study

Many of the companies that are in the business of manufacturing different goods are usually not directly involved in the process of selling those products to the end user. Often they are in cooperation with at least one organization in the supply chain that acts as a tier between the manufacturer and the end user. Often there is more than one distributing organization through which the goods travel before reaching the person or organization that actually consumes the offering. The importance of these relationships are emphasized in situations where the product is expensive, technically sophisticated and requires a rigorous maintenance program. In these situations, the relationship is rather delicate and complex, as both parties have liabilities towards each other and the offering. Furthermore, the manufacturing company has to treat the distribution organization as a business partner as well as a customer, as in many instances the distributor also represents other organizations rivaling the manufacturer. For these reasons, managing these relationships is an important part of sustaining a profitable business, but measuring the quality of the services provided for these distributors is not as straightforward, for the measuring tools designed for this kind of use are scarce.

The majority of customer service quality research has concentrated on measuring the quality of different service encounters in consumer markets. Furthermore, the conceptualization of service quality measurement is still rather theoretical, as majority of the different models offered in the existing literature do not include survey metrics or other practical contributions to service quality measurement. For its part, this study aims at offering a feasible model for service quality measurement in a b2b setting.

1.2. Research problem

Measuring customer service quality in a setting other than the typical seller-consumer requires either a new measurement tool or a modified version of one of the many existing models originally developed for consumer markets. The research problem in this study is two-fold. The first challenge is the development of a service quality measurement tool and testing the hypothesized model using a structural equation modeling approach. Secondly, we want to look at the different dimensions that make out the above-mentioned framework and determine whether or not these constructs affect each other in a way that we have hypothesized. A survey is used to gather the necessary data. Subsequently, we use the data and dedicated computer software to test the fit of our model.

The aim of this study is to develop a new scale that can be used to measure the quality of customer service in a b2b setting where the conceptual customer is not a consumer or the end user of the product or service but rather an actor in an upper tier of the value chain. More specifically the customer in this case is the distributor of the goods that the manufacturing organization produces.

1.3. Limitations of the study

The objective of this study is to develop a tool that can be used to assess the quality of the customer service in a situation where the customer is a distributor organization and the organization that is providing the service is a manufacturing company. However the results of this study are limited for they are based on a single set of data gathered from the distributors of one case company. Furthermore, this case company and its distributor organizations represent a single industry and thus it is not possible to directly generalize these industry-specific findings to another setting. Also it can be said that the dental healthcare business conducted by the case company is relation-based rather than transaction-based meaning that there is a strong emphasis on the interpersonal relationships between the employees of both the manufacturing company and the distributor organizations. This means that the way the manufacturer-distributor relationship is formed depends on the personal attributes of the people working on the customer interface and on the philosophy or policies of the organizations. This recognition means that the results of this study are affected by the way that a certain group of people in certain few organizations are used to do business and interact with one another. Generalizing the results of this study would require a broader approach to the development and testing of the model and the associated questionnaire.

1.4. Research objectives

This research topic originates from the acknowledgement that customer service in the manufacturer-distributor relationship acts as an important component of competitive advantage, customer retention and revenue. From this stems the managerial desire to enhance the comprehension of the dimensions that affect service quality and subsequently gain insight into how customers currently value the company's customer service.

The research aims at creating a customer service quality model that would be a good fit when assessing service quality in a distribution channel relationship between a manufacturing organization and the distribution organizations. The focus will be on generating a research framework and subsequently testing this model using data gathered from case company customers, i.e. distribution organizations' representatives. Using a structural equation modeling approach we aim at validating our hypothesized service quality model and relationships between the different quality dimensions it entails. In other words, two main research objectives can be identified:

RO1: Customer service quality measurement model generation based on existing literature.

RO2: Initial model testing and hypothesis verification using partial least squares structural equation modeling method.

In Chapter three, we discuss the hypotheses in more detail as the research model is introduced. The research hypotheses are a part of the research model, as we aim at verifying relations between the latent constructs that together form the different components of service quality.

2. LITERATURE REVIEW

This chapter discusses the main elements of this study. As the goal of this study is to propose a model depicting the main dimensions of service quality in the given associated context, we will introduce the main elements examined in this thesis. In particular: services, service quality and the different quality models. The purpose of this chapter is to justify the subsequent framework by going through the existing research and material regarding the above mentioned elements that are included in this study. It is necessary to review the different concepts in order to assemble the final research model.

2.1. Services in manufacturing industries

The concept of a service is relatively easy to decode if it is approached as a common term meaning a process or activity that is created simultaneously with its consumption and has an intangible basis for it. However, upon closer inspection the characterization of services becomes a more complicated task, as the different meanings of the concept can vary. Since its introduction in late 1980's the concept of *servitization* has gained remarkable foothold in the manufacturing industry as it is seen as a way to create new value adding capabilities (Baines et al., 2009). Even though this study does not address servitization as such, we believe that this paradigm has influenced the traditional thinking in a broad way, meaning that the overall attention towards service, including customer service, has increased throughout the years. Furthermore, as Gounaris (2005) points out, the understanding of what are the pre-requisites for establishing and maintaining successful long-term business relationships have been the focus of many researchers in the area of b2b service quality.

One characteristic associated to services is that they are produced and consumed simultaneously and as Grönroos (1990) points out, the customer or the consumer of said service participates as a co-producer at least to some extent. This may very well be the most important aspect of services in the context of this study. This stems from the nature of the business in question which is very relationship-based rather than transaction-based. The investment goods that e.g. the case company manufactures and sells are technically sophisticated and relatively expensive and thus the relationships between the manufacturer and the distributors are both multifaceted and close-knit. The rigorous maintenance program and strict regulatory requirements among other things will require a profounder take on the nature and content of the relationship. This also means that though many categorizations encase the implication that consuming a service does not result in the ownership of anything,

the services within the manufacturing industry often have the tangible elements comprising of the core product, in this case the medical equipment.

2.2. Different service categorizations

The growing importance of services in manufacturing industry over the last two decades has resulted in the formation of numerous different classifications and categories of services (Raddats and Kowalkowski, 2014). One approach by Parasuraman (1998) makes a distinction between *"services"* and *"service"* by declaring that *services* are stand-alone "intangible products" and a core offering in itself, while *service* is a supplementary element linked to the core offering, which can be tangible or intangible. When associated with a tangible offering, Parasuraman also refers to the latter category as a *product service*.

Similar categorization is proposed by Mathieu (2001b) as he divides services into "*customer service", "product service"* and *"services as products"*. *Customer service* refers to the overall service perceived by the customer as the second and third category can be seen as equivalent to Parasuraman's typology. Furthermore, Mathieu (2001a) divides services linked closely to own products and those that are more independent when it comes to products. Examples of these could be maintenance services and consultancy services, respectively.

In an effort to reconceptualize manufacturers' service strategies, Raddats and Kowalkowski (2014) reviewed multiple different frameworks that all classified service offerings and identified seven specific dimensions that recurred in the literature. Subsequently, they were able to synthesize the different dimensions in to two distinct categories:

1. Services supporting customer operations vs. Services supporting products
2. Services associated with own products vs. Services associated with multivendor products

Furthermore, they argued that the most exhaustive framework reviewed in their study was that proposed by Raddats and Easingwood (2010), for it includes both above-mentioned groups. Figure 1 illustrates the matrix of the service categories.

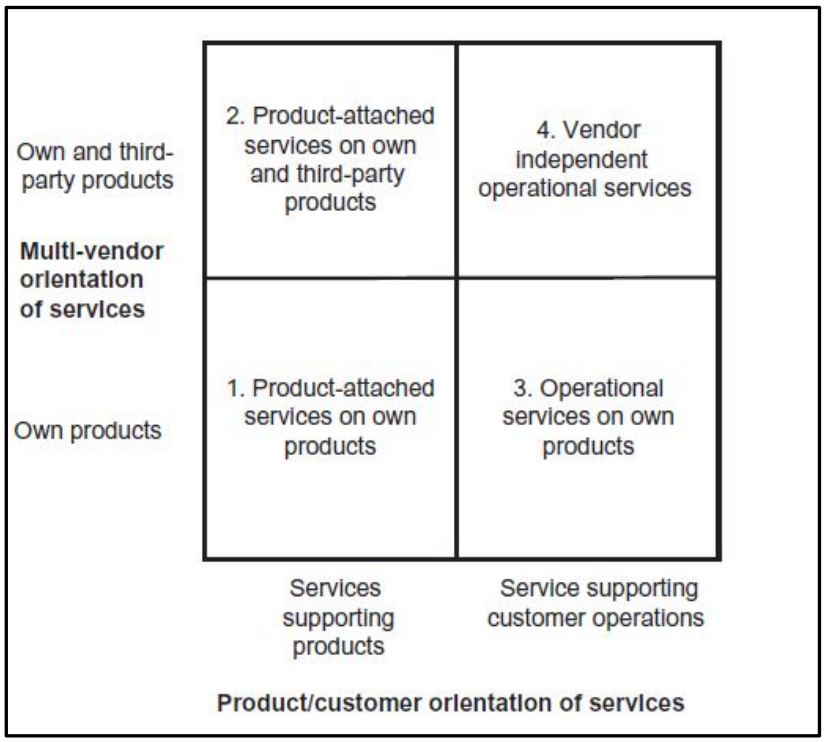

Figure 1. Framework of service categories (Raddats & Easingwood 2010)

It should be noted that the services that will be evaluated for their quality in the case example of this study fall into the first service category of the framework by Raddats and Easingwood (2010), for they represent product-attached services provided for the distributor and regarding the company's own product portfolio.

2.3. Definitions of service quality

The conceptualizations of different service quality perceptions are among the most debated topics in service marketing literature (Caseres & Paparoidamis, 2007). One major reason for this is the intangibility of services, making them hard for customers to evaluate objectively. It is more difficult to reach consensus on what are the attributes that constitute the quality of a service than it is to do that in the case of products. Product quality is easier to measure objectively using indicators such as durability and number of defects (Parasuraman, Zeithaml & Berry, 1985).

In other words, the basic characteristics of service - intangibility, inseparability, heterogeneity and perishability - make it hard to measure or establish a specific degree of service quality. One widely acknowledged classification identifies five broad categories of quality:

- Transcendent quality
- Product led quality

- Process led quality
- Customer led quality
- Value led quality

According to Ghobadian, Speller and Jones (1993) this classification can be used to examine the different aspects of service quality. For example, *product led quality* is defined as "units goodness packed into a product or service". In another words, this definition relies on the ability to quantify these units of goodness. In practice this is not easily accomplished in the case of services.

Another definition more suitable for services is the *transcendent quality*, where quality is an innate excellence and can be only recognized through experience, i.e. you cannot define quality but you know it when you see it. Unfortunately also this quality definition has poor practical applicability because of the challenge with identifying quality determinants (Ghobadian, Speller & Jones, 1993). In general the above classification of five different quality types is rather overlapping in a sense that quality of a certain service includes aspects from more than one of the categories and it is not appropriate to try and compartmentalize the quality of the services analyzed in my thesis to a certain category.

2.3.1. Perceived quality vs. objective quality

A number of researchers, for example Holbook and Corfman (1985) have made a distinction between perceived quality and objective quality. The general idea between this division is that customer does not comprehend the idea of quality in the same manner as researchers, who approach it through a concept that distinguishes mechanistic and humanistic quality aspects. The former includes the objective features of a product or service event while the latter involves the subjective experiences of customers and aren't objectively measurable.

2.3.2. Quality as attitude

One approach to conceptualizing service quality is to view it as analogous to attitude. That is, quality is an overall evaluation of a product or service. This is similar to the above-mentioned transcendent quality definition, which interprets quality as an innate excellence that can be described as unquantifiable attribute. It is something that you can't measure but you know it when you see it. What makes this conceptualization interesting is the exploratory research conducted by Parasuraman, Zeithaml and Berry (1985) that supports the idea that quality is an overall evaluation. Using twelve focus groups consisting of customers of four different

services they discovered that customers used basically similar general criteria when evaluating the quality of a service.

Furthermore, a distinction between quality and satisfaction is made with the statement that satisfaction is something that is related to a single transaction, whereas quality is a broader judgment relating to the overall quality of a service. In the focus group interviews, several respondents described how they were satisfied with a specific service encounter but still did not regard the service company as having high quality. The researchers point out that these individual incidents of satisfaction will over time affect the perception of service quality. (Parasuraman et al., 1985).

2.3.3. The Gap-approach

One of the early definitions of service quality was based on the disconfirmation paradigm. This concept was introduced by Parasuraman, Zeithaml and Berry (1985) and has probably been the most used service quality framework ever since. This approach depicts service quality as a gap between what the customer expects of the service and what s/he perceives to receive. This philosophy is probably still the most used basis for the measuring service quality and it has fended its position throughout the decades but not without critique. We will discuss the Gap-approach and SERVQUAL service quality model and the above-mentioned problems involved in them in more detail in the next section.

2.4. Different service quality models

Since the mid-eighties, a large number of different service quality models have introduced by different researchers. As a result, there are also a number of meta-analyses conducted that aggregate these frameworks and assess their different features. These analyses have been a good stepping-stone when considering different service quality models as a theoretical backdrop to this thesis.

A study by Seth, Deshmukh and Vrat (2004) reviews 19 different service quality models and assesses them based on their characteristics. This meta-analysis of different service quality models gathered a lot of attention in this research because it was one of the most recent publications on the subject and had a comprehensive set of different frameworks.

Notably many of the models suffer from lack of actual measurement procedures that can be used to assess service quality, nor do they have a track record of published studies where the framework has been put to the test, i.e. many models are quite theoretical. Furthermore, the

models seem to focus mainly on consumer context with little attention to b2b relationships. The study aggregates the different models into two different categories. This division is discussed next.

The influence of the Gap/SERVQUAL-model by Parasuraman et al. (1985) is visible as many of the other frameworks are refined from this model, e.g. eight of the nineteen models reviewed use SERVQUAL-based measurement instrument (Deshmukh and Vrat, 2004). In addition there are numerous variations of the original SERVQUAL-model that have been tailored for a better fit in designated situations, e.g. INTSERVQUAL (Frost & Kumar, 2000) for evaluating internal service quality and INDSERV (Gounaris, 2005) for evaluating b2b service quality. The INDSERV scale represents an attractive alternative as it focuses on service quality in business relationships. While it is basically the same type of framework as the original SERVQUAL, it includes some modifications to the metrics. These differences in the model are quite subtle but it is evident that this conscious modification towards the b2b viewpoint certainly makes this model interesting. However, this model would also require case specific modifications and thus the INDSERV-model won't be any more an "off-the-shelf" solution for this thesis than the original SERVQUAL – or any other – model. To summarize, these above-mentioned quality models form the first category that includes frameworks that are developed using a gap approach or use the SERVQUAL tool as it was originally formed or a variation of it for measuring service quality.

The second category consists of quality models that don't stem from the SERVQUAL-model or use other variations of the Gap-approach. In other words, even though the different models use different metrics and emphasize different aspects towards service quality, a division can be made between those models that rely on the expectation-perception gap as a measure of quality and those that use "performance-only" metrics to assess service quality. Maybe the most notable model that represents the latter school of thought is the SERVPERF-model by Cronin and Taylor (1992). This was developed as an option for the SERVQUAL-model after it received critique from the expectation-perception paradigm of service quality (Van Dyke, Kappelman & Prybutok 1997). Cronin & Taylor (1992, 1994) claimed that the gap approach was flawed because there is little evidence that customers assess service quality in terms of expectation-perception gaps and that performance-only metrics provides a more qualified method of quality measurement. It is worth noticing however that the SERVPERF-model uses the same 22-item scale originally used in the SERVQUAL-questionnaire, with the exception that in the SERVPERF-model, only performance related statements are collected while

excluding the expectation statements (Seth et al., 2004). SERVPERF's approach that is essentially SERVQUAL without the expectation metrics is an interesting viewpoint to the problem at hand, because we share similar reservations towards the expectation-perception paradigm to what Grönroos (2007, p. 87-88) brings forth. Grönroos points out that the whole concept expectation is rather ambiguous and it isn't necessarily very practical to measure this construct for three reasons:

1. Measuring expectations at the same time or immediately after the service experience, it can be argued that what is measured isn't in fact the expectation of the person but rather something that has already been biased by the actual experience.
2. It may not be reasonable to measure the expectations prior to the service event either, because those prior expectations may not be the same the customer uses to compare the actual experience with. This is because the actual service experience might alter the expectations and these altered expectations are then compared with the actual experience.
3. It can be argued that measuring expectations is not a reasonable way to approach the concept of service quality because of the nature of experience. To elaborate, since experiences can be described as perceptions of reality, they already encompass prior expectations. Subsequently, as Grönroos concludes, if expectations are measured separately followed by the measurement of experiences then the expectations are in fact measured twice.

In spite of these problems disclosed above, there is a strong theoretical justification in measuring the expectation-perception gap, because it is quite self evident that we measure the success of a service we experience based on the preceding estimation of what we are going to get. The SERVPERF-type of an approach gets additional support from a study conducted by Liljander and Strandvik (1997) in which they examined different metrics that could be measured alongside actual experience metrics. The study concluded that it actually might be best not to use a gap approach in measuring service quality, but rather measure only the experienced service quality for it should yield a good approximation of overall service quality.

In addition to the ambiguity of the concept of expectations (van Dyke et al., 1997) another systematic source of critique towards the Gap-model (and its variants) is its process orientation. The focus of the service dimensions is on the service delivery process rather than

on the actual outcome of the service event (Buttle, 1994). This process vs. outcome perspective works as an outline for group of service quality models that treat service quality as a combination of the service delivery process and the service outcome. A prominent example of this type of quality conceptualization is the technical & functional quality model by Grönroos (1984).

In this model, service quality is argued to comprise of three components: technical quality, functional quality and image. Technical quality is described as the quality that the customer receives as a result of the service outcome while functional quality relates to the service interaction itself, i.e. it is the quality of the process that delivers the functional quality. Image functions as a mediator between the quality dimensions and the customer and thus affects customer expectations. (Grönroos, 1984).

2.5. The ISO standards

The ISO standards, mainly the ISO 9000 and the ISO 14000 are families of quality standards established by the international organization of standards and they are widely implemented across the world by over 600 000 organizations. The ISO 9000 is concerned with quality management, while the ISO 14000 standards are relates to environmental management. Both standards focus on the production process rather than to the product itself and especially the ISO 9000 standards have a well-established role as a reference for management quality in business-to-business commerce. Even though the majority of the standards are product-, material- or process-specific, ISO 9000 and 14000 standards are generic in a sense that they can be applied to any organization, large or small. Furthermore there are no restrictions as to the type of the offering; it can be a tangible product or a service. These quality systems are constructed around the processes of the organizations implementing these standards and one noteworthy attribute is that these standards do not require the organization to change the processes or management systems to suite them but rather allow these standards to be adopted to different organizations. (Metters et al., 2007.)

2.6. Theoretical basis for the study

The vast number of different quality models offers a collection of starting points to this study. Probably the most prominent quality framework is the SERVQUAL-model and thus it was the first model that was taken into closer examination. The metrics used in SERVQUAL is quite easily applicable to the survey used in this study and cover a quite a lot of different sectors on customer service quality. As mentioned before the SERVQUAL/Gap –model

conceives quality as a difference between the expectation and performance of a quality dimensions. Figure 2 illustrates the Gap-model.

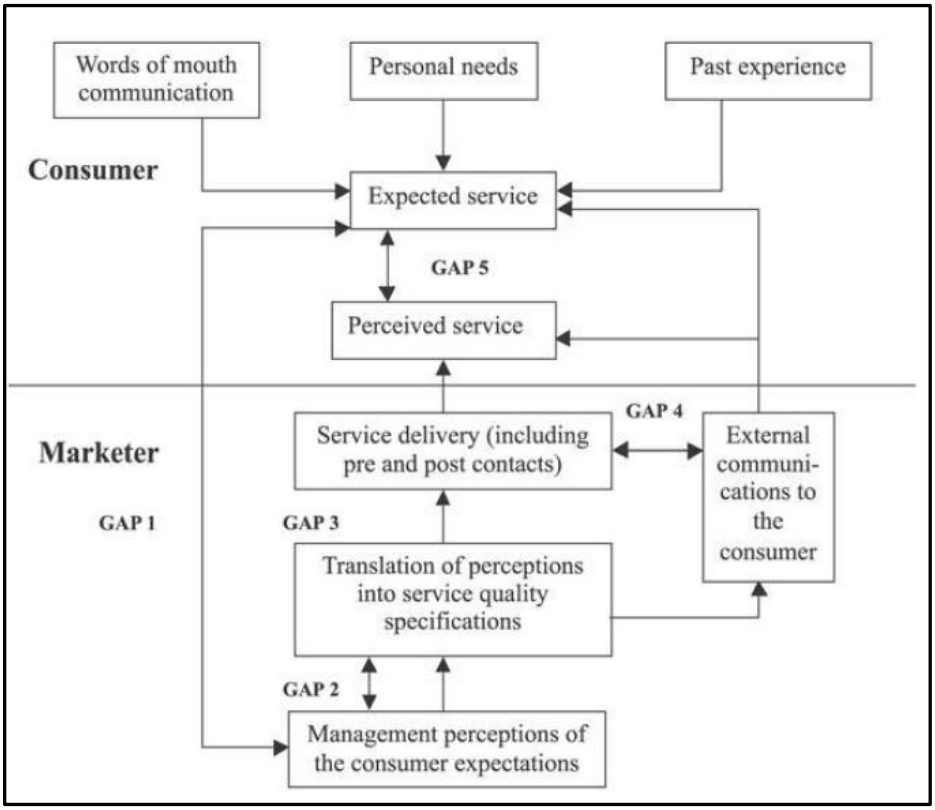

Figure 2. SERVQUAL-model (Parasuraman et al., 1985)

Even though the framework identifies five different gaps, the only gap under examination in terms of the questionnaire is Gap 5: Difference between customer's expectations and perceived service. Parasuraman et al. (1988) refined the conceptualizations and the ten original dimensions of service quality were synthesized into five dimensions. These dimensions are listed in Table 1 and they are the dimensions around which the quality measurement questionnaire is built. In other words, five dimensions in Table 1 and the subset of questions linked to each dimension are used to measure Gap 5 – service quality.

Table 1. 5 dimensions of service quality (Parasuraman et al., 1988)

Dimensions	Factors
Tangibles	Physical facilities, equipment and appearance of personnel.
Reliability	Ability to perform the promised service dependably and accurately.
Responsiveness	Willingness to help customers and provide prompt service.
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence.
Empathy	Caring and individualized attention that the firm provides to its customers.

The SERVQUAL-model was chosen as a starting point of this study primarily because of its metrics and because we are able to adopt this metrics with minimum pruning and editing. Furthermore, we made the decision not to include the expectation scores in this study for a number of reasons, which were also discussed in the previous section of this thesis. First of all, it is clear that the concept of expectation is quite vague and nonspecific. Measuring the expectations of customers that have already been "exposed" to the services they are evaluating will not yield appropriate information about real expectations but rather scores of something that has already been biased by the actual service experience. Secondly, as Grönroos (1990) points out, experiences are perceptions of reality and thus include prior expectations. This means that if expectations are measured and then the experiences are measured, the expectations are in fact measured twice.

However, we did not discard the concept of another scale associated to the metrics. In general, we appreciated the idea of measuring the expectation scores but thought that in practice it might not yield the desired results because of the ambiguous nature of the expectation concept. With this in mind we decided to substitute the expectation scores with importance scores. This means that the participants were given a 5-point Likert-scale that they could use to evaluate the importance of each of the questions asked in the study. The importance data is used for intra-organizational analysis and will not be included in the study analysis.

Another service quality framework that was under more detailed examination was the technical & functional quality model by Grönroos (1984), illustrated in Figure 3. This model has its advantages over SERVQUAL for its consideration of technical (outcome) quality in

addition to the process quality perspective. On the other hand, the original model does not offer exact guidelines on how to measure the two quality functions and SERVQUAL's dimensional construct has been employed in numerous studies and it has an established status as a service quality framework, though not without criticisms.

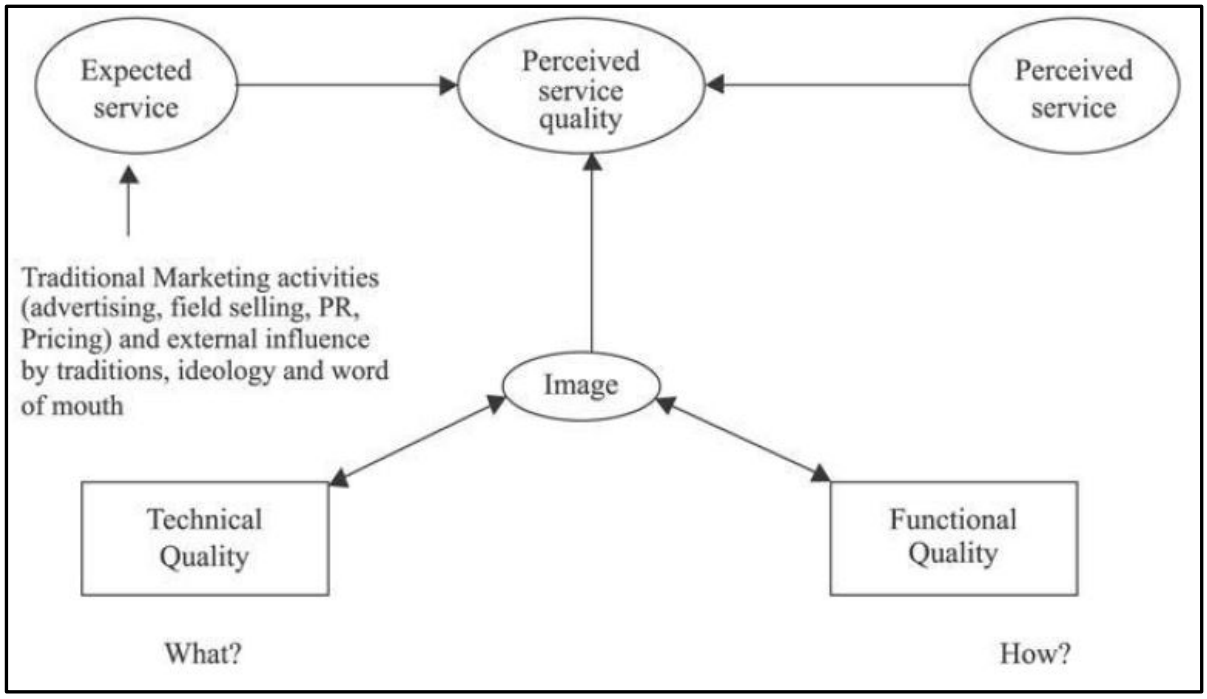

Figure 3. Technical & functional quality model (Grönroos, 1984)

The original framework by Grönroos offered little originality in terms of metrics. However one practical approach to Grönroos's model was found in a form of a study by Kang and James (2004) as they empirically assessed the technical & functional quality model using a cell phone service provider a case organization. Figure 4 illustrates their research model. While constructing their research model, they exploited SERVQUAL-models service process –oriented metrics to assess functional quality and formulated technical quality attributes to suit the case organization's service offering (Kang & James, 2004).

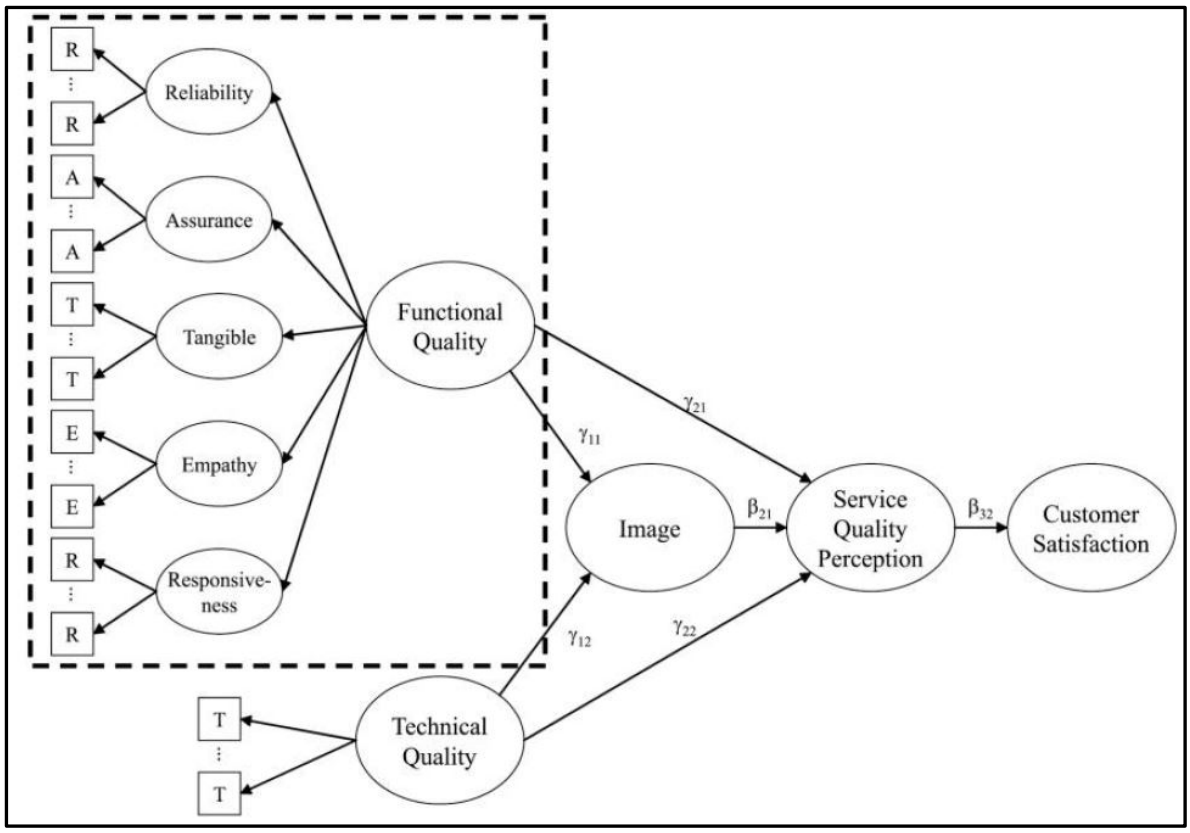

Figure 4. Research model used by Kang and James (2004)

The adaptation formulated by Kang and James had a certain appeal to it since it acknowledged Grönroos's idea of quality having two dimensions to it, the process quality and the outcome quality, identified in the framework as functional and technical quality, respectively. However, the actual metrics of this framework was borrowed from the SERVQUAL instrument with additional questions included to measure the technical (outcome) quality dimension. The case company being a cell phone service provider with arguably a transaction-based service offering, the questions used to measure the technical quality of the provided service were quite straightforward and did not correspond to our idea of how to measure technical quality of the services in the context of our study. However, this study furthered our conviction to use the metrics of the SERVQUAL-model in our questionnaire.

The third service quality model under closer scrutiny was the INDSERV-model by Gounaris (2005). This framework was the outcome of an attempt to formulate a service quality measurement tool that could be used in a business-to-business context. In the original research Gounaris evaluated his method against the SERVQUAL instrument and concluded that the INDSERV instrument yields competitive results when measuring service quality in a b2b

setting. The INDSERV instrument combines four dimensions that constitute the overall service quality:

1. Potential quality
2. Hard quality
3. Soft quality
4. Output quality

Gounaris (2005) divides quality into these four dimensions suggesting that potential quality relates to attributes that customers use to evaluate the service providers ability to perform the future services. Hard and soft quality are similar constructs as Grönroos's functional quality as they aim at measuring the quality of the service process. Hard quality pertains to what is being done in the service process whereas soft quality is concerned with how the service is done during the service process. Outcome quality aims at explaining the customer's attitude towards the service that has been delivered and the broader impact that the service produces for the organization that is buying the service.

After reviewing the different service quality models and the metrics (i.e. questions) they used to measure customer service quality, we decided to borrow survey items both from the SERVQUAL model and the INDSERV model and further refine our questionnaire with items generated in cooperation with the case company quality department to reinforce our metrics with questions regarding the aspects of service delivery that weren't explicitly covered with the existing questions. The original service quality dimensions (the RATER approach in SERVQUAL and the above-mentioned four quality constructs of INDSERV) would then be modified to generate new clusters of metrics in order to identify key latent constructs in a manufacturer-distribution service relationship. These dimensions that were formed using both SERVQUAL and INDSERV metrics were then supplemented with our own survey metrics. The data analysis would have an exploratory nature in terms of how the different quality dimensions interact and affect each other. The next chapter discusses the theoretical framework constructed using the above-mentioned building blocks as well as the methodology used in the case example.

3. RESEARCH METHODOLOGY AND CASE DESCRIPTION

The purpose of this chapter is to describe the empirical methods used to answer the research questions set for this thesis. This part of the study starts with an introduction of the case company and its industry followed by a brief comment on the general methodological approaches on service quality measurement. It is followed by a description of the chosen statistical method as well as a description of the data acquisition process. The limitations of the chosen method in this research context are also discussed.

3.1. Theoretical framework for this study

This section briefly explains the theoretical framework based on the characteristics discussed in the previous chapter. The different metrics from SERVQUAL and INDSERV along with the customized questions was consolidated according to their substance and subsequently eight different constructs were formed:

1. Tangibles & visuals
2. Accessibility
3. Information
4. Employee assurance
5. Service delivery
6. Employee response
7. Service outcome quality
8. Customer value

Constructs 1-4 are perceived as a contribution to the service process that in turn contribute to the output of the service relationship, manifested here as the Quality of service and more strategic Customer value. Constructs 5 and 6 depict the service process that is hypothetically influenced by the input constructs (constructs 1-4). The two dimensions in this category, Service delivery and Employee response, aim at aggregating the quality of the delivery process and the response of company employees in when assistance is requested, respectively. As constructs 5 and 6 can be seen as an adaptation of the functional quality, constructs 7 and 8 bear resemblance to the technical quality paradigm. The Service outcome quality dimension includes metrics that measures the satisfaction of customers regarding the level of service support and product quality. Furthermore, the Customer value construct is a more strategic

take on the output side of quality as it the output quality metrics adopted from the INDSERV model as well as one customized question.

Next we will discuss the different constructs briefly in terms of what metrics were included in each latent variable and what is the common denominator in these questions i.e. why the hypothesized model is constituted the way it is. Please note that a comprehensive list of all the latent variables and the associated questions (i.e. indicators) can be found in appendices.

Tangibles & visuals

Tangible was a construct developed by Parasuraman et al. (1985) as a part of the SERVQUAL construct. The original model describes the dimension as something that includes ”physical facilities, equipment and appearance of personnel”. In our study, this construct includes two original SERVQUAL questions (Tangibles 1, Tangibles 2) as well as one of the customized metrics (Tangibles 3: PM has visually appealing online content).

Information

The information construct aggregates metrics that is associated with the quality and accessibility of information. This hypothesized dimension includes question from the INDSERV instrument (Information 1, Information 3, Information 4) as well one of the customized questions (Information 2: It’s easy to find correct information from company website or Dealer Support).

Accessibility

Accessibility is concerned with aspects related to how easy it is to contact – or access – company personnel as a customer. It is also concerned with the courtesy of the sales personnel when it comes to their proactive contact frequency towards the customer, an aspect that affects the customers’ accessibility. This construct combines metrics from both the SERVQUAL (Accessibility 1, Accessibility 3) and INDSERV models (Accessibility 2, Accessibility 4).

Employee assurance

Employee assurance combines “soft” metrics associated with the employees’ reliability and ability to make the customer feel comfortable while transacting with the company. It also measures the employees’ effort towards giving enough personal attention to individual customers. This construct initially includes metrics from the SERVQUAL model (Assurance

1, Assurance 2, Assurance 3) as well as one question from the INDSERV metrics (Assurance 4).

Service delivery

Service delivery dimension includes metrics that assesses how well the company manages its delivery process, starting from an easy product ordering process and moving towards the quality of order delivery with respect to completeness and timeliness. This hypothesized construct aggregates INDSERV metrics (Delivery 1, Delivery 2) with our customized questions (Delivery 3: PM has reasonable delivery times, Delivery 4: PM has an easy product ordering process).

Employee response

Employee response aims at assessing the way employees response to and handle requests, complaints and their ability to get customers' problems solved with one phone call. This construct is the second process oriented construct along with service delivery and can also be seen as a counterpart to the employee assurance dimension in a sense that these questions measure "hard" metrics associated with employee input and response. This dimension includes questions from both SERVQUAL (Response 3) and INDSERV (Response 1, Response 4) models as well as a custom question (Response 2: Ability to get problems solved with one phone call/contact).

Service outcome quality

Service outcome quality metrics measures the output of the previously introduced process dimensions. The questions concern the perceived satisfaction towards product quality, service support and the company's ability to provided different services as promised and right the first time. These questions stem from both SERVQUAL (Quality 3, Quality 4) and INDSERV(Quality 1, Quality 2) models.

Customer value

Customer value is the final construct of the theoretical framework established in this study. It is more strategic take on the output quality as the metrics for this construct are taken from the INDSERV model, more specifically the output quality metrics of that model (Value 1, 2, 3). One customized survey item was also included in this cluster of questions (Value 4: I'm satisfied with the level of PM's product innovation and technological leadership in the field).

3.2. Quantitative approach on service quality

An idea of the common methodology of measuring service quality can be ascertained from the review of different service quality models by Seth et al. (2004) that we referred to in the review of literature. The models that aren't purely conceptual and thus have a measurement tool. This is the case with fifteen of the nineteen models discussed in the study. Eleven out of those fifteen models that have a designated data collection method use a survey questionnaire method. Furthermore, seven of those eleven questionnaire approaches use a seven-point Likert-scale while other approaches include five-point Likert and seven-point semantic scales. Several data analysis methods have been used in these studies, most notably different factor analysis techniques and and/or Structural Equation Modeling (SEM).

A quantitative approach was chosen in terms of the research method for this study. This was mainly influenced by the fact that majority of the service quality models reviewed for theoretical reference use quantitative tools, although there are also models relying on qualitative approaches such as the E-service quality model by Santos (2003) and another internet service related framework by Broderick and Vachirapornpuk (2002). It was clear that the best method of collecting data from the representatives of the distribution organizations would be a survey that would yield numerical data. This was mostly because the participants were geographically dispersed eliminating for example the possibility of a face-to-face interview approach. Furthermore, the case company representatives argued that there would be few incentives whereby the people surveyed in this study could be pledged to go beyond answering a concise questionnaire. In addition we decided that a quantitative method with its emphasis on the objectively verifiable facts that stem from the ontological realism as described by Hirsjärvi, Remes & Sajavaara (2007:135) would the appropriate approach. Considering the nature of the relationship between the manufacturer and the distribution organizations we reasoned that the best way to get as neutral answers as possible would be via a straightforward and structured questionnaire with no open ended questions. The biggest challenge with the quantitative survey-based approach would be the inevitably small sample size, given the fairly small population of dealers from which the most relevant participant would be selected. Furthermore, the response rate would determine the final data amount.

There are a number of different quantitative methods of choosing from when analyzing numerical data. When considering these different possibilities, one must take note of the limitations of certain methods. As Haenlein and Kaplan (2004) recapitulate, the so-called first-generation techniques such as regression-methods and factor analysis have three

common limitations. Firstly, these methods assume a simple model structure. Even though every model will eventually disregard parts of the reality that is under observations, these first generation approaches might be too simplistic to successfully analyze complex situations. Secondly, the models assume that all variables are observable while it can be argued that if a variable cannot be observed directly in real life set up, it is in fact unobservable. This starting point renders all but few variables, such as age or gender, unobservable. The third limitation has to do with the presumption that all variables are measured without error - systematic or random. As with the baseline notion of observable variables, the idea that variables can be measured without error might not be the most appropriate outlook. (Haenlein & Kaplan, 2004)

These limitations that we reviewed in the preceding section have contributed to the increased usage of Structural Equation Modeling (SEM). SEM is a second-generation data analysis method that allows us to measure latent variables, i.e. the above-mentioned unobservable constructs by using observable metrics. Thorndike (2007) uses measuring of human intelligence as an illustrative example of SEM approach as one cannot measure intelligence in a similar manner than height, for instance. To overcome this problem, a theory of the construction of intelligence is developing. Subsequently a measurement tool, i.e. an intelligence test consisting of questions designed to measure intelligence is formed. This test is then used to collect data from recipients and this data can then be used to assess measure intelligence, which is the latent variable in this example while the questions act as the observed variables. The next section will discuss Structural Equation Modeling in more detail.

3.3. Structural Equation Modeling

Structural Equation Modeling has two main approaches to it. The original SEM model is the covariance-based (CB-SEM) model introduced by Jörgeskog in 1973. This approach is widely used as a data analysis method in situations where the sample size is relatively large and the theoretical background is strong in a sense that the variables can be carefully chosen and the model can be quite carefully specified. CB-SEM has a more confirmatory approach to SEM than the other option, a variance-based Partial Least Squares (PLS-SEM) approach.

PLS approach has increased its importance as a SEM method since its introduction and this is the method that is going to be used also in this study. Certain characteristics of the PLS method support its utilization over the covariance approach in the context of this research. First of all, there is the issue of sample size. Reinartz et al. (2009) observed that a sample

sizes exceeding 250 would yield better results in terms of accuracy and consistency if the covariance-based CB-SEM approach is used. The theoretical maximum sample size for this study was around 200, given the amount of potential participants, so it was apparent that the minimum requirement of sample size for covariance-based analysis would not be met. Furthermore, PLS is preferable if the theory development is at an early stage and the research focuses on identify the latent variables and relationships between them, whereas CB-SEM is a better solution if the focus is on the confirmation of assumed relationships (Reinartz et al., 2009).

The PLS model is comprised of two different components, a *structural model* and a *measurement model.* The structural model reflects the potential causal dependencies between the endogenous and exogenous variables. The measurement model is the part of the model that shows the relationships between the unobservable (i.e. latent) variables and their indicators (i.e. the survey components). Figure 5 is a simplified illustration of the PLS model and its components.

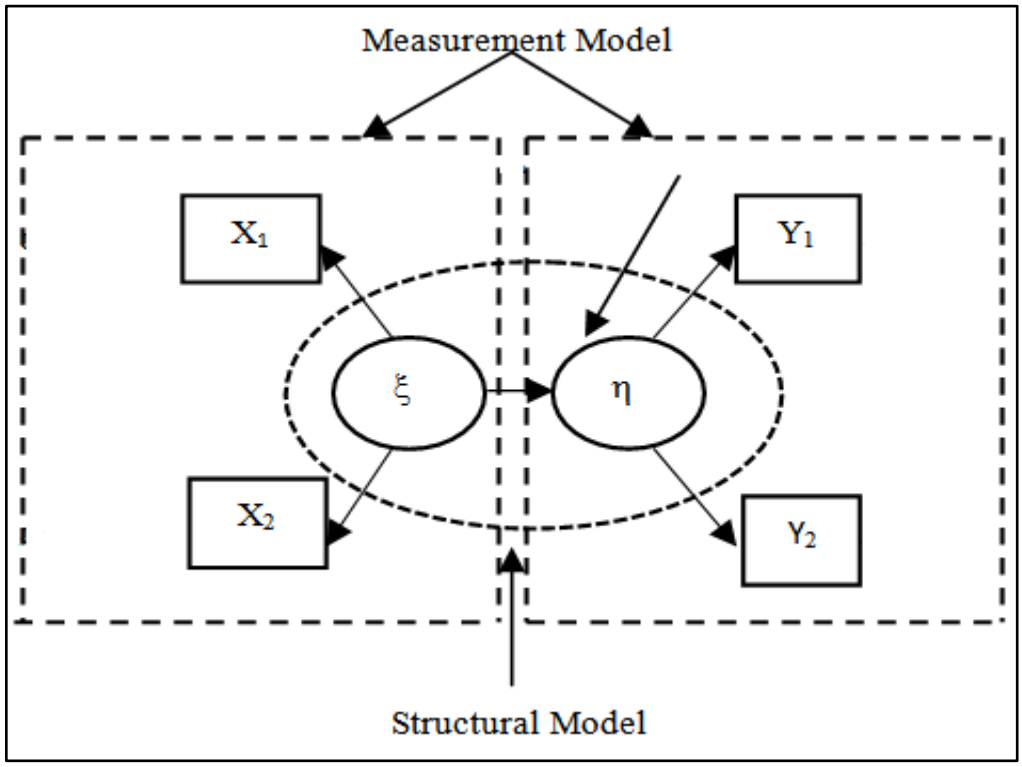

Figure 5. Illustration of the inner and outer PLS models (Awaluddin, 2015)

The dashed oval shape in the illustration above depicts the structural model, i.e. the relationship between the exogenous latent variable (ξ) and the endogenous latent variable (η). The dashed squares marks the measurements model, in other words section of the model that

focuses on the latent variables and their indicators (X_n, Y_n) which are the observable variables, i.e. survey items.

As Haenlein and Kaplan (2004) adduce, the strength of the PLS method - and SEM in general - is the ability to examine unobservable structures such as the different service quality components through observable variables. These observable items are associated to the unobservable variables using available theory. The unobservable latent variables are divided into the above-mentioned exogenous and endogenous types. The exogenous variables are ones that are not explained by the model, but are rather considered to be influenced by factors external to the model. On the other hand, the endogenous variables are explained in the model by the relationships between other constructs. That is to say, the exogenous variables explain other constructs in the model whereas the endogenous variable are being explained. (Diamantopoulos, 1994.)

The above-mentioned observable variables (or indicators) are used to measure the unobservable constructs in the model. These indicators can be divided into two different categories as they are either dependent on the latent variable it measures (reflective indicator) or are the cause of the latent variable (formative indicator). Figure 6 illustrates the difference between reflective and formative indicators. (Haenlein & Kaplan, 2004.)

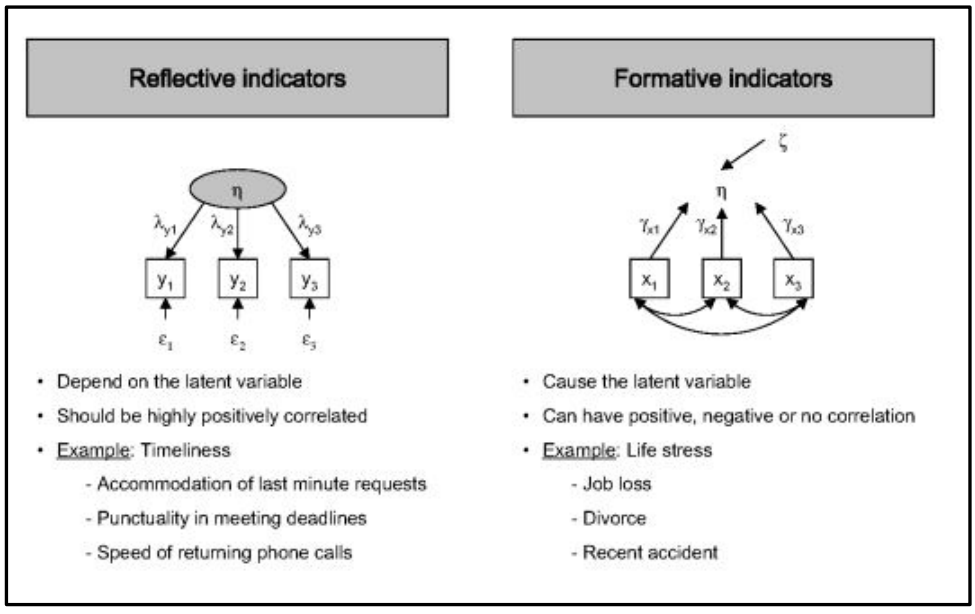

Figure 6. Reflective vs. formative indicators (Haenlein and Kaplan, 2004)

As noted in the figure above, reflective indicators should always be positively correlated, as they are dependent on the common latent variable, whereas formative indicators that cause the

latent variable in question to be either positively or negatively correlated or have no correlation at all. (Haenlein & Kaplan, 2004.)

3.4. Introducing the case company: Planmeca Oy

The following sections briefly describe the case company Plameca, as well as Planmeca Group, a corporation formed by several independent companies parented by Planmeca. The actual research will be conducted in co-operation with the sales department of Planmeca while Planmeca Group as an individual entity is described mainly for illustrative purposes.

Planmeca, the Finnish parent company of Planmeca Group, designs and manufactures dental equipment: dental units, 2D and 3D X-ray devices, digital imaging solutions and software. Planmeca is the world's third largest dental equipment manufacturer and the largest privately owned company in the field. The majority of Planmeca's products (ca. 98%) are sold to 120 countries worldwide through subsidiaries and distributors. This forms the core of Planmeca Group's business activities.

Planmeca Group consists of six companies: In addition to Planmeca, Planmeca Group is formed by Planmed Oy, a manufacturer of mammography equipment and orthopedic imaging equipment; LM-Instruments Oy, a manufacturer of dental hand instruments; Opus Systemer AS, a Norwegian designer of dental practice management software; and Triangle Furniture Systems Inc., a Canadian manufacturer of cabinets and sterilization centers for dentistry. In addition to the five manufacturing business divisions, PM Group also includes a dental supply house Plandent Oy, along with its European subsidiaries and affiliate companies. Operating in 13 European countries, Plandent is a supplier of dental services and products, including materials and instruments.

Planmeca Group is headquartered in Herttoniemi, Helsinki and employs approximately 2,700 people, of which 900 in Finland. The Group's turnover for the year 2014 was approximately 740 million Euros. (Source: company website)

3.5. The increased importance of the service element in dental business

Managing product quality has presented itself as a relatively straightforward endeavor for industrial organizations whose main function has been the design and manufacturing of a variety of durable goods. Especially in the dental healthcare device sector, represented by the case company, it is imperative to not only meet the clinical and customer requirements but also a considerable number of very specific regulatory requirements. This along with the

complexity of the devices being designed and manufactured as well as the shortening technology life cycles has made the management of product quality a pivotal issue within the organization.

The growing global competition and the generally acknowledged servitization paradigm have increased the importance of services in the dental equipment business as well, as Raddats and Kowalkowski (2014) recognize manufacturers' orientation to utilize services in the effort of differentiating their offering. In other words, many manufacturers have aligned their strategies and subsequently business models towards delivering complete solutions where the product is only one dimension of a bundled offering also including dedicated software and various services.

A benchmarking study conducted in 2003 by Colm Foley and Götz Gerecke suggested that the medical technology industry is facing a change in their clients' purchasing decision process. This along with the relatively high sales and administration costs (compared with other tech manufacturing industries) call for more attention towards certain crucial areas such as key account management marketing. Furthermore, the study suggests that by the end of this decade we will witness a change in the global market, as the purchasing organizations grow stronger while the global market is still relatively weak. At the same time, the aging population in industrialized countries as well as the growing wealth in emerging markets will manifest in growing healthcare investments. The authors suggest that increased competition and buyer awareness along with healthcare investments will mean diminishing gross margins and increasing number of unit sales. In other words, this means that the year-to-year growth induced by increasing sales margins is giving way to growing sales volumes.

The study also suggests that in order to remain competitive in the future, companies should focus on few critical areas such as market strategy, key account management - and customer service. As sales margins from products diminish and product face commoditization, companies must upgrade their value proposition using differentiating services in order to retain their competitive edge. Moreover, the benchmarking study reveals that service revenues are growing at three or four times the rate of product revenues and technical services are already in many cases among the most profitable business sectors for large equipment manufacturers. Services can also justify higher product costs when considering the overall solution.

In addition, key account management is identified as a critical function when aligning the business towards the shifting environment. It is not unusual in the medtech industry that the top 10 percent of customers can generate half of the revenue and thus making sure that these customer accounts are managed properly is vital.

3.6. Planmeca's business model and its customers

As an initial frame of reference to this thesis, the company's business model should be discussed in brief. Figure 7, adopted from Parasuraman (1998), shows a classification of seller-distributor relationships in b2b value chain. Planmeca designs and manufactures dental health care devices and software, the majority of which are sold to end users worldwide through subsidiaries and independent vendors. In the context of Parasuraman's classifications, the company sells the tangible good to the distribution organization at the first level of the supply chain and the distributor then resells the product as it is to the end users.

This distributor-tier between the company and the end users of their products means that there is no single right answer to the question "who is our customer?" Obviously the end users, the dental healthcare professionals are the company's customers for they are the ones to whom the company designs and manufactures their offering. But in addition to the end user base, the vast network of distributors (referred to as "dealers" in the company) forms another group of stakeholders whose relationship with the company allows them to be also characterized as customers.

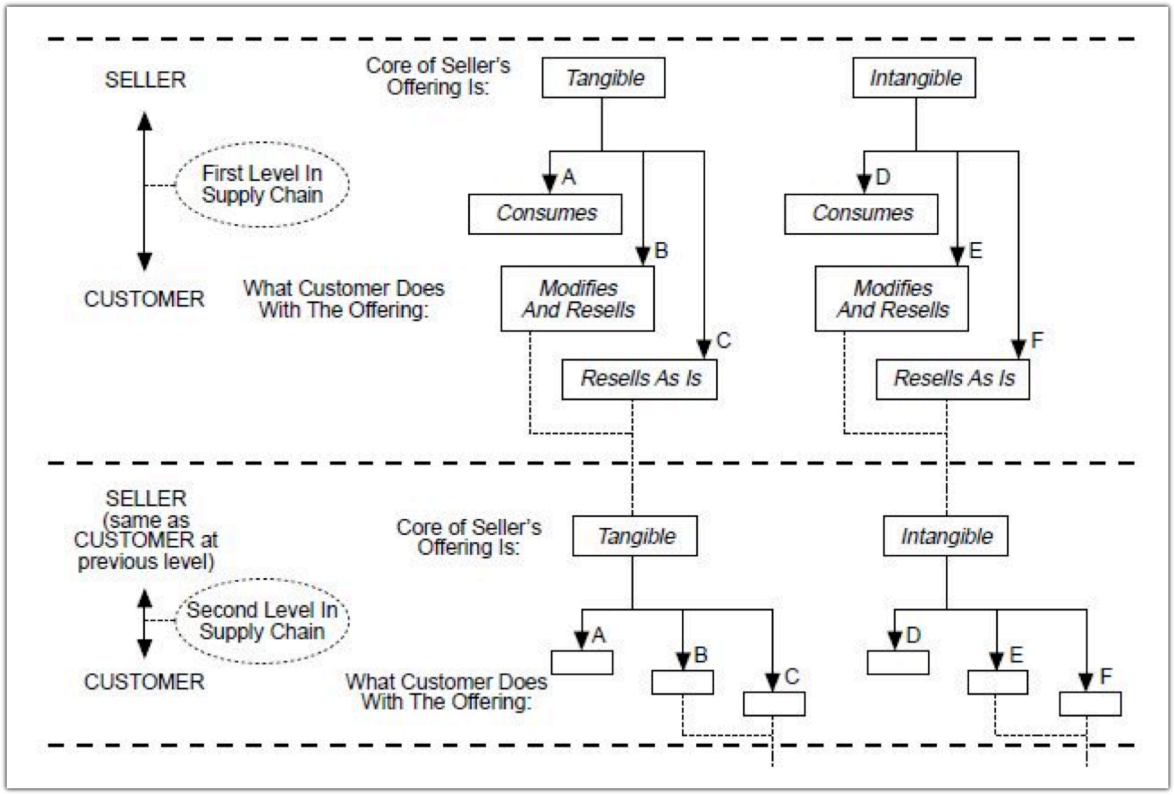

Figure 7. Classification of seller-distributor links in b2b markets (Parasuraman 1998)

When the business model involves a network of independent distributors between the company and the end users, the manufacturer-distributor relationship becomes more important as the distributors are the ones operating on the end-user boundary. Importance of this relationship is strengthened by the various mutual liabilities concerning the core products such as product maintenance obligations and technical staff training.

The business processes have certain characteristics, which allow us to examine the manufacturer-distributor relationship from a customer service quality point of view. Even though these distributors are in many cases independent operators and have an intermediary role between the case company and the actual end user, the relationship and the dynamics between the manufacturer and distributor are more complex than one might presume. The distribution organizations, especially the larger ones, have a relatively big influence and authority that the distribution organizations have over the manufactures. This means that there are a lot of customer-specific adjustments in products and processes and quite a lot of time and energy is used to "keep the dealers happy" as one case company representative expressed. In many instances, the close-knit relationships have demanded an ad-hoc approach to conducting business, even rebooting the manufacturing of an already cancelled product.

3.7. Research model

The research model of this study is based on the metrics used both in the SERVQUAL and INDSERV service quality models. That is to say, the research model and hypotheses are formed using the survey questions introduced in these models with additional questions formed in collaboration with the case company representatives. These questions are meant to supplement the existing metrics where they were perceived to fall short in terms of covering all the necessary aspects of manufacturer-distributor relationship. The research model is an exploratory approach to identifying different service quality dimensions in a b2b service relationship, more specifically in a relationship between a manufacturing organization and the organizations that buy these products and subsequently sell them to end users.

The research model and hypotheses that are included in the formation of this model are based on the aggregation of the above-mentioned metrics with respect to service quality dimensions that have been identified in previous studies on the subject. It also takes into account the technical vs. functional quality (i.e. process vs. outcome quality) paradigm and aims at compartmentalizing different latent structures with respect to this concept. Figure 8 illustrates the hypothesized model.

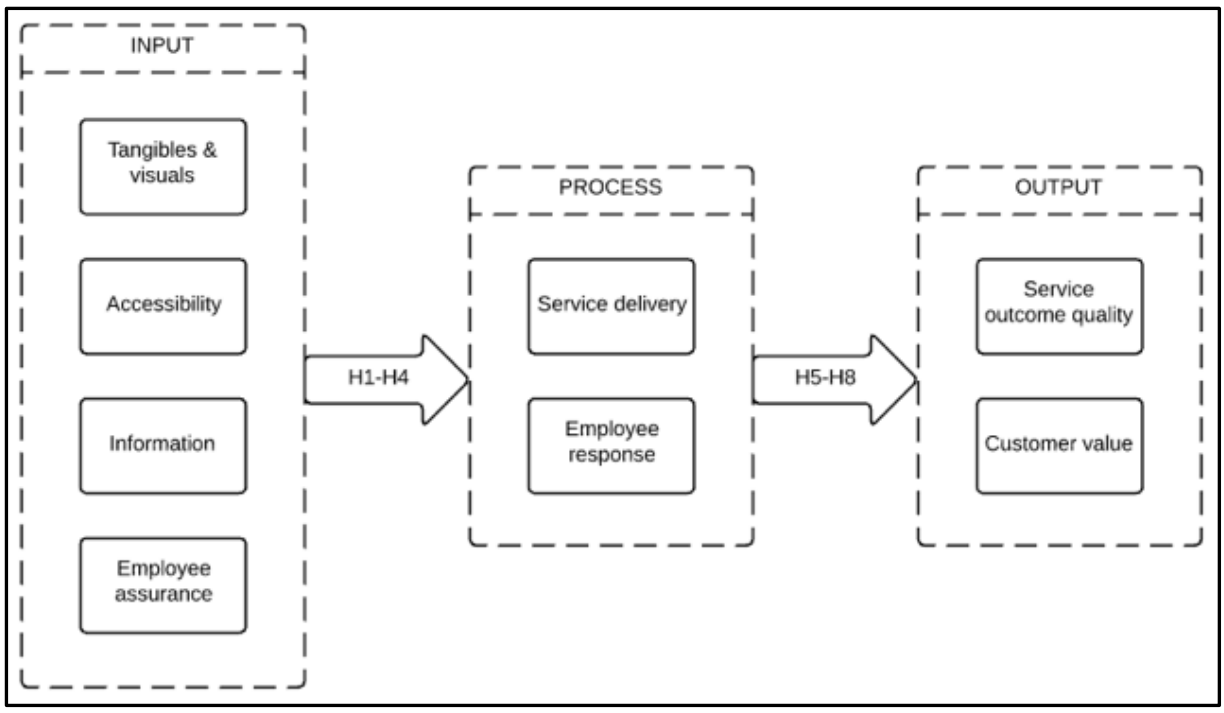

Figure 8. The research model.

The hypothesized model is a traditional input-process-output approach on service quality dimension identification. The leftmost column in the model depicts latent constructs that act

as an *input* dimensions to the service process and subsequent outcomes. These input constructs represent the exogenous latent variables that aim at explaining other constructs in the model. The *process* column includes constructs that are hypothesized to measure the service process while the *output* constructs measure the service output both from operational (service outcome quality) and strategic (customer value) perspectives.

Figure 9 also aggregates the different hypothesis between the latent constructs. The hypotheses associated with this research model are as follows:

H1: Tangibles & visuals positively affect service delivery
H2: Accessibility positively affects service delivery
H3: Information positively affects employee response
H4: Employee assurance positively affects employee response
H5: Service delivery positively affects service outcome quality
H6: Employee response positively affects service outcome quality
H7: Service delivery positively affects customer value
H8: Employee response positively affects customer value

3.8. Data collection

The data used in this study was collected via a questionnaire that was answered by a selected group of case company dealers (the distribution organizations) of Planmeca. Each area export manager was given the task of going through the list of accounts that they were in charge of and short listing the most substantial distributors who would subsequently be added as survey recipients. In addition to these external dealers, the survey was also sent to a number of recipients inside the case organization who have a similar relationship with the sales department. This group consisted of personnel from different subsidiaries of Planmeca Oy. The selected participants were added to a mailing list, which was used to send an endorsement letter from the vice president of sales inviting the recipients to answer the questionnaire. Attached to the e-mail was a link which led to a landing page within the company website where the actual questionnaire was embedded. The questionnaire was created using software called ClickDimensions, which is a third-party software add-on that is integrated into Microsoft Dynamics CRM platform.

Attached to the survey invitation was a cover letter where a request was made regarding the actual participant within a distribution organization. It was requested that the questionnaire would be answered by such person of a given organization who is in charge of Planmeca-

related activities and contacts at that end on a daily basis, thus having a firsthand experience of the company's services in all of its aspects. We thought that it was important to emphasize this because in some organizational cultures answering questionnaires of this kind might be considered a managerial task and that may result in a situation where the answers have been given by a person with no actual firsthand experience of the matters covered in the questionnaire.

The final list consisted of 200 individuals from around the world. The logic behind collecting this list of recipients was twofold. Firstly, we wanted the body of recipients to represent the global distribution network as extensively as possible. Secondly, we made a conscious decision of excluding certain distributors based on their overall activity and volume of business. The case company has hundreds of active distributor accounts in its database but the bulk of these accounts are very small in terms of market share, turnover and overall business influence. In addition, many of these active accounts might actually be under different status or the relationship between the organizations might be currently nonexistent. However, it is worth noticing that the survey was aimed only at those distributors who are in direct contact with Planmeca's sales organization located in Helsinki. This means that certain market areas such as the United States are not included in this study, because the case company's subsidiary Planmeca USA Inc. has an autonomous sales organization and thus no direct day to day interaction is established between the parent company sales department and the distributors operating in the United States.

In total, 62 people from the 200 contacts that received the invitation to participate in the survey submitted their answer during the two-week period in June of 2015 that the web-based survey was active.

3.9. Survey design

The survey was used to measure eight separate constructs:

1. Tangibles & visuals
2. Information
3. Accessibility
4. Employee assurance
5. Service delivery
6. Employee assurance
7. Service outcome quality

8. Customer value

All the questions in the survey are adopted from the INDSERV-model (Gounaris 2005) and from the SERVQUAL-model (Parasuraman et al., 1985). There were also questions that were created in collaboration with the case company representatives and act as a courtesy element in this study. In essence, this component of the study was designed to allow the inclusion of certain question into the survey that didn't have a theoretical background as such but measured attributes that the company representatives identified as being of high importance to them. That being said, the questions introduced into the survey via this method contained the same elements as all the other questions and thus we don't see that this data collection was in any way compromised by this effort.

In total, the questionnaire had 32 research questions spread on six pages. All of the questions had a 7-point Likert scale with the following scale:

1. Strongly disagree
2. Disagree
3. Somewhat disagree
4. Neither agree nor disagree
5. Somewhat agree
6. Agree
7. Strongly agree

A 7-point Likert scale was used mainly because it seems to be a well-established practice among similar service quality measurement models. The questions were distributed between the six survey pages based on how the questions could be modified with minimum changes to facilitate a common phrase on top of each page in order to shorten the actual questions so that there would not be any repetition in the question sentences. This also served another purpose since the questions were mixed so that not all the questions from one category were on the same page. The questionnaire and all the answers were in English, no Finnish version of the survey was made.

In addition to the 7-point scale, there was an additional 5-point scale associated with every research question that allowed participants to rate the importance of each question:

1. Not important
2. Slightly important

3. Moderately important
4. Important
5. Very important

The importance data obtained through the survey was not included in the SEM-analysis and was meant for case company use only. Furthermore, the questionnaire was used to collect background information via three additional questions as well as an open text box where the participants could leave comments regarding business issues that might've risen while doing the questionnaire. This data was also left out of the SEM-analysis.

4. ANALYSIS

4.1. Organizational role and geographical distribution of respondents

Even though the questions concerning respondents' organizational role and the information on the geographical distribution of respondents were included in the questionnaire mainly to collect information that could be used by the case company in their analysis, we think that it is appropriate to comment on them briefly in the context of this study. Included in the questionnaire were two questions that did not contribute to the research model and PLS-SEM analysis. There first question concerned the organizational role of the respondent and the other was an open field question that encouraged respondents to submit any comments that might have arose concerning the questionnaire. The geographical distribution of respondents was obtained through Planmeca's CRM-software. Because each respondent received their invitation to take part in the questionnaire via their personal e-mail, individual answers could be allocated to a certain person. This information includes the geographical data of each respondent, or more specifically, the country in which the organization - that the respondent represents - conducts business. Figure 9 illustrates the geographical distribution of the respondents.

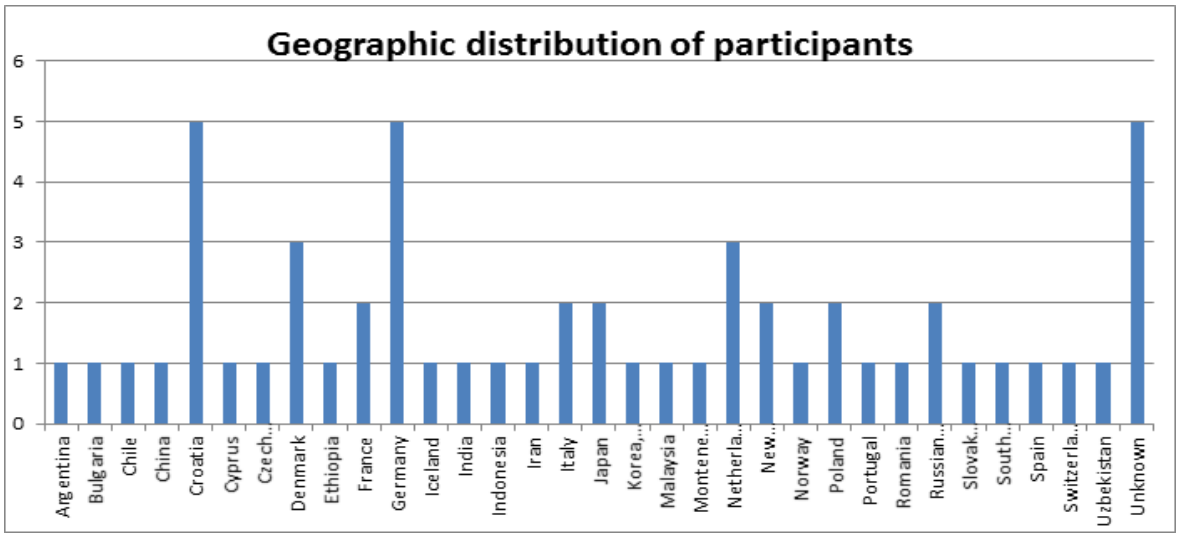

Figure 9. Distribution of survey participants.

As can be seen from the figure above, most of the countries that are represented have one participant each which is understandable, for the many of the organizations are relatively small and there aren't necessarily that many employees in direct contact with Planmeca's sales department. Then again, for example there are five participants from Germany, which is logical since Germany is one of the biggest market areas. Furthermore the larger market areas such as Germany have multiple distribution organizations, which affects on the number of potential participants. The fact that there are five participants from Croatia could be considered exceptional but that can be due to consolidated market areas; a distribution organization in a certain country may represent a larger geographical area and thus have a bigger organization. It is also worth mentioning that the reason why there are no participants from the Americas is due to the fact that all business activities in North and South America are handled by Planmeca USA Inc., a subsidiary of Planmeca Oy and there is no direct day-to-day contact between the local distributors and the sales department of the Finnish parent company.

As mentioned in the previous section, all the respondents were asked to choose their organizational role from a drop down list at the end of the questionnaire. The different roles that the respondents could choose from were:

1. Administrative
2. Management
3. Sales
4. Sales & Technical
5. Technical

Majority of the respondents identified themselves as either being in a managerial position or having a combined sales and technical role in the organization. Figure 10 illustrates the distribution of different roles between the survey participants.

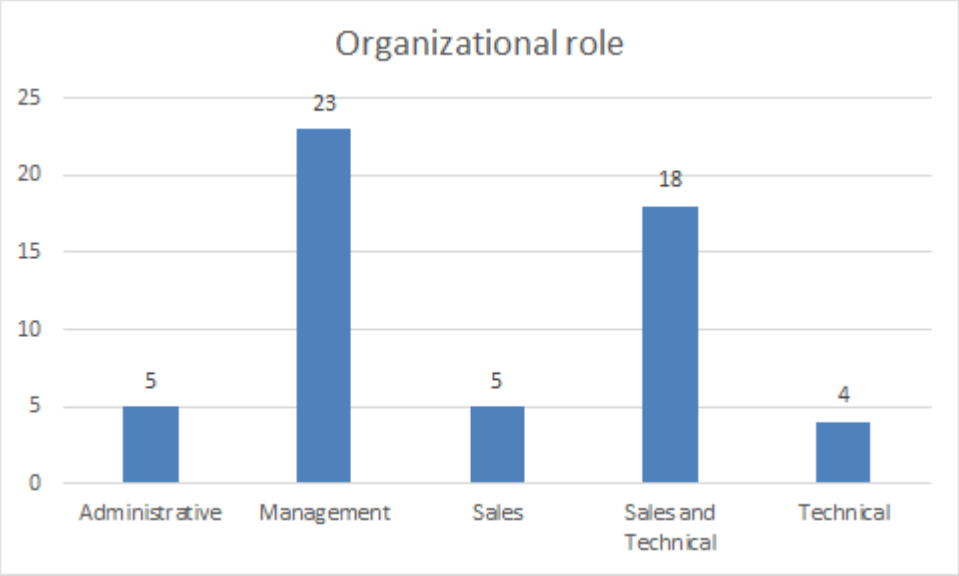

Figure 10. Organizational role of survey participants.

The survey cover letter urged participants to choose a member of the organization that is actually in day-to-day contact with Planmeca's sales department to answer the questionnaire. The challenge was to avoid the situation in which a person in a managerial position would answer the questionnaire without the actual experience from the distributor-manufacturer interface. In some more hierarchical business cultures the survey, sent by the relatively high ranking vice president of sales, might end up in the "wrong hands" if it is considered something that requires answers of a person in a managerial position. Nevertheless, the relatively high number of survey participants in managerial positions can be partly explained by the relatively small size of many of the dealer organizations. The same logic applies with the high share of participants identifying themselves as being involved both in sales and technical issues. It is common to handle both sales and technical issues and only in bigger distribution organizations there is a clear distinction between sales and technical personnel.

4.2. The PLS model

The PLS analysis was initiated using the hypothesized research model that we introduced in the previous section of this study. This initial model had 31 reflective indicators, four exogenous latent variables and four endogenous latent variables. A table of all the latent constructs along with the indicators can be found in appendices.

The first SmartPLS analysis was conducted using the default settings. This meant that the software performed a maximum of 300 iterations, which is commonly agreed to be a good standard setting (Wong, 2013). The results are assessed based on a number of different indicators and key figures. If the measurement model is reflective, as it is in this study, the following metrics should be reviewed and commented:

- Endogenous variable variance
- Inner model path coefficients
- Outer model loadings
- Indicator reliability
- Internal consistency reliability
- Construct validity
- Structural Path Significance (Bootstrapping)

(Wong, 2013).0

The initial results were a good starting point although it was clear that there would have to be some adjustments made. Figure 11 shows the initial SmartPLS model with outer model loadings, coefficient of determination (R^2) values and path coefficients. The initial results show that the coefficients of determination (R^2) for the endogenous variables are between 0,667 and 0,839. Wong (2013) points out that a level 0,75 is considered substantial and 0,50 is considered moderate while 0,25 is weak. In light of these threshold values, the initial results can be seen as acceptable as Service delivery and Employee response explain 83.9% of Service outcome quality and 67,4% of the Customer value construct.

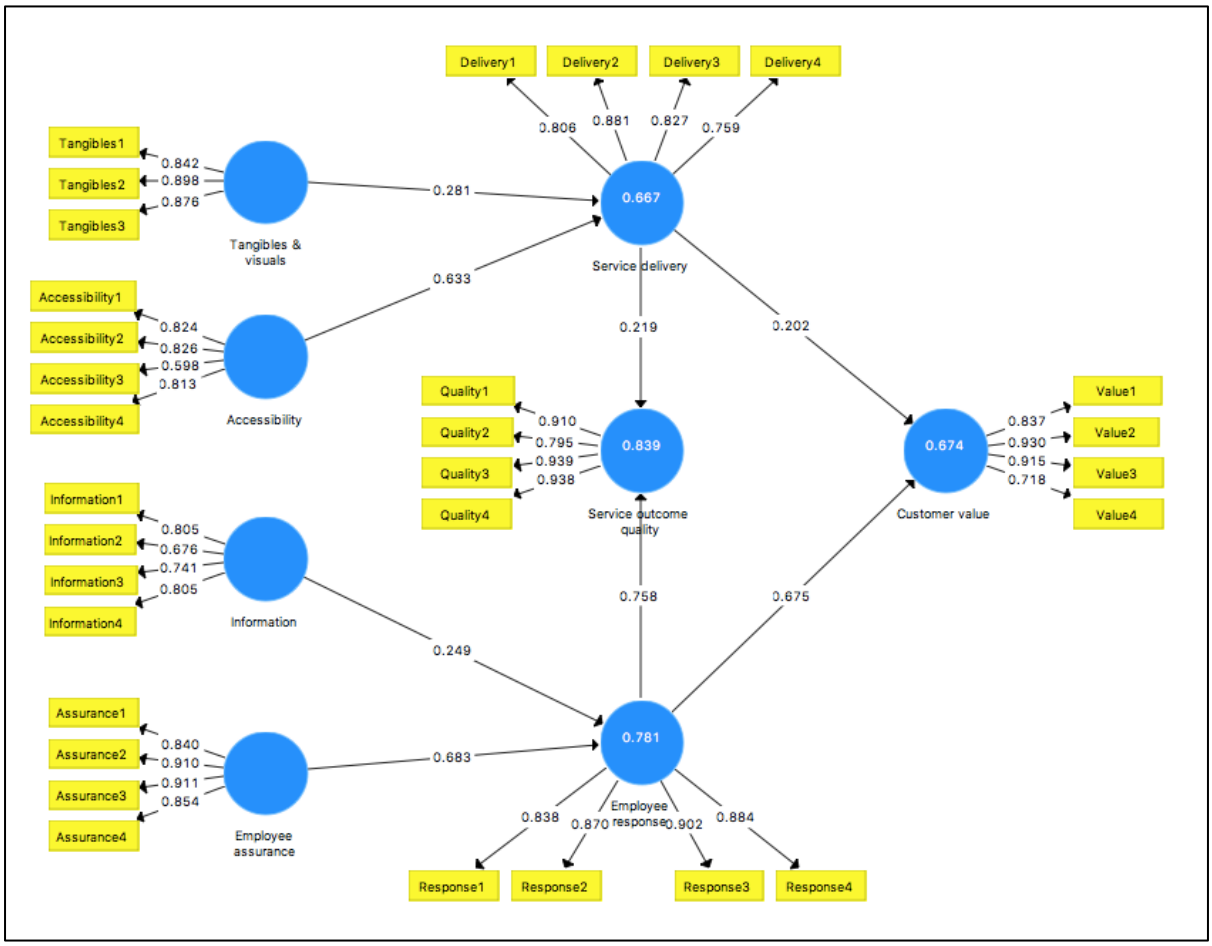

Figure 11. Initial PLS-model.

When looking at the inner model path coefficients of the initial analysis, it can be seen that all path coefficients between the exogenous and endogenous variables are statistically significant since their path coefficients are higher than 0,1. The path coefficients between the endogenous latent variables also have consistency in terms of statistical significance. We will continue to discuss the above-mentioned path coefficients later on in this chapter.

The third characteristics that are under observation are the outer model loadings. The initial model shows that only two indicators have a loading lower than 0,70 that is considered the lower bound. These indicators are Accessibility 3 and Information 2 with loadings of 0.598 and 0.676, respectively. When considering the fact that in exploratory research a loading higher than 0,40 is acceptable, the outer loadings and thus the indicator reliability in our initial calculations can be considered good. (Haenlein & Kaplan, 2004.)

In addition to the outer loadings, reliability can be assessed from the viewpoint of internal consistency reliability. Traditionally, this has been done with a statistical metric called Cronbach's alpha, but it has been estimated to be too conservative a measure when using PLS-SEM and thus a number of previous researchers have suggested the use of composite reliability as a substitute for Cronbach's alpha (Wong, 2013). In the initial model the figures for composite reliability are good. These figures are not discussed in detail for the initial model, but are discussed in the next section where the refined PLS model is introduced.

The validity of a PLS-SEM model should be assessed both from the viewpoint of convergent validity and on the other hand with discriminant validity in mind. Convergent validity refers to the degree to which the hypothesized survey components actually relate to each other. (Hair et al, 2011.) In other words, the indicators that are assigned to the same latent construct should relate to each other. The Average Variance Extracted (AVE) is used to measure convergent validity and it should be 0,5 or higher in order for the model to have sufficient convergent validity. The figure indicates the degree to which the variance of the indicator is explained by the latent variable. As with composite reliability, the convergent validity for the initial model is good does not require particular attention when refining the initial model.

The other aspect of construct validity is discriminant validity. Whereas convergent validity aims at assessing how well hypothetically related indicators actually relate to each other, discriminant validity assesses how well the different constructs in this study are unrelated as they are hypothesized to be. Discriminant validity can be assessed by using the Fornell-Larcker criterion or by looking at the indicator cross loadings. The Fornell-Larcker criterion can be used to determine whether a latent variable have more variance with its indicators than with other latent constructs (Hair et al., 2011). Table 2 illustrates Fornell-Larcker calculations for the initial model. Indicator cross loadings table shows the loadings across all the variables and indicators. Naturally these loadings should be the highest between the indicator and the variable it is associated to.

Table 2: Fornell-Larcker criterion for initial model.

Variable	Accessibility	Customer value	Employee assurance	Employee response	Information	Service delivery	Service outcome quality	Tangibles & visuals
Accessibility	**0.771**							
Customer value	0.652	**0.854**						
Employee assurance	0.701	0.773	**0.879**					
Employee response	0.684	0.807	0.868	**0.874**				
Information	0.741	0.753	0.739	0.755	**0.759**			
Service delivery	0.781	0.644	0.647	0.655	0.698	**0.819**		
Service outcome quality	0.753	0.811	0.851	0.901	0.773	0.715	**0.898**	
Tangibles & visuals	0.528	0.663	0.651	0.645	0.756	0.615	0.695	**0.872**

As can be seen in the table above, the Fornell-Larcker method shows some problems with discriminant validity regarding Accessibility, Employee response and Information variables as the square root of AVE is not the highest in the bolded diagonal for these constructs. This means that these variables have more variance with another latent variable than with their designated indicators.

Next we looked at the cross loadings table to further determine the possible problems with discriminant validity. Table 3 shows the cross loading for our initial PLS model and it can be seen that there are few indicators that don't have the highest loading on the variable it is assigned on. As mentioned earlier, there are two indicators that have a loading under 0,7 across the board. Even though these indicators have loadings that are considered acceptable

in an exploratory research, we decided to remove these indicators because of their negative effect on discriminant validity.

Table 3: Initial model cross loadings.

Indicator	Accessibility	Customer value	Employee assurance	Employee response	Information	Service delivery	Service outcome quality	Tangibles & visuals
Accessibility1	0,824	0,351	0,419	0,410	0,551	0,727	0,509	0,413
Accessibility2	0,826	0,581	0,660	0,626	0,635	0,668	0,639	0,394
Accessibility3	0,598	0,489	0,626	0,527	0,509	0,442	0,611	0,500
Accessibility4	0,813	0,652	0,510	0,594	0,599	0,505	0,607	0,358
Value1	0,525	0,525	0,631	0,714	0,495	0,524	0,657	0,449
Value2	0,593	0,930	0,739	0,758	0,722	0,619	0,766	0,676
Value3	0,558	0,915	0,646	0,710	0,639	0,569	0,710	0,555
Value4	0,561	0,718	0,624	0,556	0,671	0,466	0,635	0,596
Assurance1	0,666	0,628	0,840	0,729	0,580	0,552	0,699	0,437
Assurance2	0,561	0,703	0,910	0,765	0,651	0,481	0,745	0,595
Assurance3	0,625	0,755	0,911	0,766	0,671	0,526	0,752	0,632
Assurance4	0,614	0,629	0,854	0,788	0,692	0,709	0,792	0,616
Response1	0,553	0,715	0,752	0,838	0,535	0,453	0,736	0,509
Response2	0,634	0,699	0,740	0,870	0,684	0,651	0,780	0,535
Response3	0,619	0,714	0,878	0,902	0,758	0,577	0,845	0,657
Response4	0,584	0,693	0,650	0,884	0,649	0,609	0,783	0,543
Information1	0,424	0,622	0,508	0,612	0,805	0,519	0,635	0,703
Information2	0,435	0,517	0,455	0,449	0,676	0,331	0,555	0,607
Information3	0,641	0,520	0,633	0,589	0,741	0,570	0,546	0,456
Information4	0,729	0,571	0,633	0,619	0,805	0,656	0,612	0,546
Delivery1	0,675	0,577	0,570	0,550	0,587	0,806	0,620	0,603
Delivery2	0,667	0,585	0,476	0,488	0,615	0,881	0,580	0,528
Delivery3	0,612	0,512	0,522	0,548	0,530	0,827	0,572	0,393
Delivery4	0,597	0,444	0,521	0,567	0,550	0,759	0,568	0,477
Quality1	0,741	0,711	0,807	0,801	0,726	0,657	0,910	0,613
Quality2	0,491	0,602	0,660	0,740	0,571	0,482	0,795	0,614
Quality3	0,714	0,824	0,821	0,864	0,734	0,707	0,939	0,616
Quality4	0,737	0,759	0,758	0,826	0,731	0,704	0,938	0,657
Tangibles1	0,451	0,588	0,624	0,584	0,568	0,491	0,644	0,842
Tangibles2	0,404	0,582	0,543	0,581	0,686	0,567	0,611	0,898
Tangibles3	0,531	0,569	0,544	0,526	0,716	0,547	0,569	0,876

In addition to these two indicators, there were additional survey items that had a loading over 0,7 but didn't score the highest possible scores within the assigned variable or had overlapping high loadings across multiple latent variables. In case of Response 3, the indicator had the highest loading on the designated variable but also had high loadings on other, undesignated constructs. This was also the case with Quality 3, which had the highest loading on the designated latent construct but also loaded strongly onto other variables. In addition, Assurance 4 had a high loading on Employee assurance but also on other latent constructs. Furthermore, Value 4 was the fourth indicator assigned to Customer value but had the seventh highest loading on that construct.

At this point, we decided to take corrective measures in order to improve the discriminant validity of the study. We decided to delete a number of indicators. Indicators Information 2 and Accessibility 3 were deleted from the refined model because of their overall loadings of under 0,7. Indicators Quality 3, Response 3 and Assurance 4 were deleted not because of their outer loadings, all of which exceeded 0,7 but because of the overlap of the loadings across different latent variables, as described in the previous section. Value 4 was deleted because it loaded weakly on to the designated latent construct Customer value. Finally, indicator Delivery 4 was deleted because of problems regarding the relatively small sample size.

There are various different rules of thumb regarding the minimum sample size. Wong (2013) suggests that the minimum sample size can be determined by the number of arrows pointing at a latent variable. Hair et al. (2012) suggests that the minimum sample size is calculated as being ten times the maximum number of paths. In this study, the minimum sample size is calculated by taking into account the maximum number of indicators on a given construct as well as the paths from other latent constructs. In the initial model, all the endogenous variables have four indicators and two latent constructs that predict them. This means that the minimum sample size should be 60. As other latent variables were left with three indicators due to above-mentioned problems with certain survey components, Service delivery was the only construct that was left with four usable indicators. The decision was made to delete the indicator with the weakest loading in order to meet the minimum sample size requirements. This was indicator Delivery 4.

We presumed that deleting these above-mentioned indicators would improve the discriminant validity of the model without compromising other qualitative elements too much, since all of them were at an adequate level in the initial model.

4.3. Refined model results and analysis

After deleting the above-mentioned indicators, the PLS calculations were performed again using the same settings as with the initial model. The refined model is illustrated in Figure 12. The coefficient for determination (R^2) for Service outcome quality and Customer value in the adjusted model were 0,760 and 0,673, respectively. In the case of Service outcome quality this is somewhat less than in the initial model (0,839) but still fairly good. Similarly, the coefficients for Employee response and Service delivery dropped slightly but were still relatively good.

Outer loadings in the refined model were also good across the board as expected, since their absolute values were not an issue in the initial model. The lowest outer loading in the refined model was 0,780.

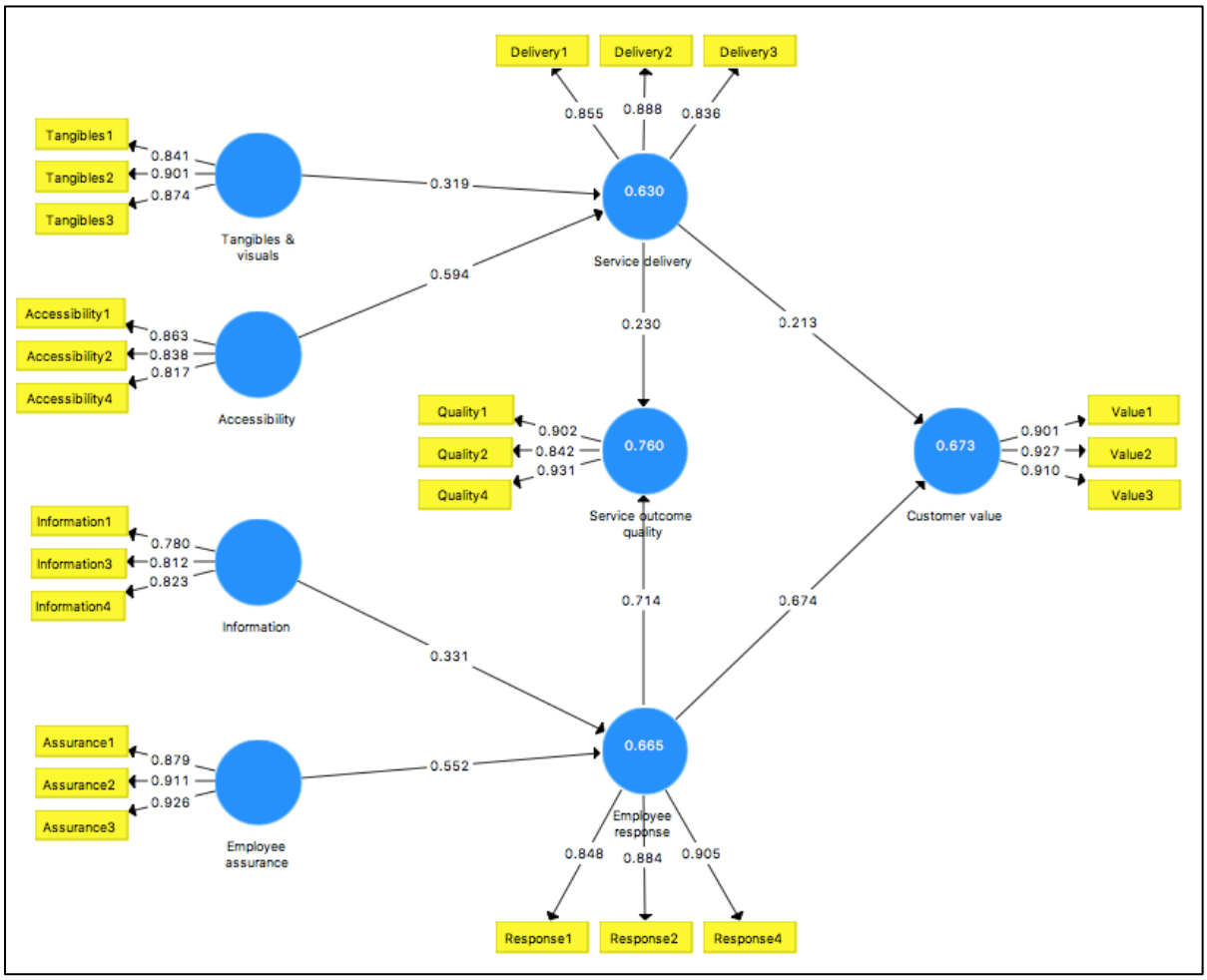

Figure 12. Refined PLS-model

The reliability of the refined model improved slightly in terms of composite reliability. In this model, there were five latent variables that saw an increase of the reliability figure, while one variable retained its original values and another two saw a slight decrease from the initial values (Table 4).

Table 4: Composite reliability and AVE for refined model.

Variable	Composite Reliability	AVE
Accessibility	0,877	0,705
Customer value	0,937	0,833
Employee assurance	0,932	0,820
Employee response	0,911	0,773
Information	0,847	0,649
Service delivery	0,895	0,740
Service outcome quality	0,921	0,797
Tangibles & visuals	0,905	0,761

As with the validity figures that proved to present the biggest challenge when assessing the initial model, the removal of the indicators did in fact improve the validity of the model. First of all, the AVE figures showed a similar transition as composite reliability, with values of six variables increasing and one decreasing while one latent construct retained its original AVE value. Furthermore, the square root of AVE in the Fornell-Larcker criterion showed that in the refined model the values were now the highest for each latent variable, compared with the other variables. Table 5 shows the Fornell-Larcker analysis for the refined model.

Table 5: Fornell-Larcker criterion for refined model.

Variable	Accessibility	Customer value	Employee assurance	Employee response	Information	Service delivery	Service outcome quality	Tangibles & visuals
Accessibility	**0.840**							
Customer value	0.562	**0.913**						
Employee assurance	0.608	0.733	**0.906**					
Employee response	0.621	0.802	0.780	**0.879**				
Information	0.713	0.654	0.690	0.711	**0.805**			
Service delivery	0.742	0.619	0.546	0.603	0.702	**0.860**		
Service outcome quality	0.678	0.739	0.791	0.852	0.732	0.660	**0.893**	
Tangibles & visuals	0.464	0.615	0.611	0.602	0.707	0.595	0.703	**0.872**

In addition to the Fornell-Larcker criterion we also examined the cross loadings for the refined model. They also supported the perceived improvement in discriminant validity, as

the indicator loadings were now the highest on their assigned variable, without exceptions (Table 6).

Table 6: Cross loadings for refined model.

Indicator	Accessibility	Customer value	Employee assurance	Employee response	Information	Service delivery	Service outcome quality	Tangibles & visuals
Accessibility1	0.863	0.308	0.367	0.385	0.552	0.744	0.505	0.412
Accessibility2	0.838	0.550	0.673	0.639	0.667	0.600	0.637	0.392
Accessibility4	0.817	0.639	0.536	0.597	0.594	0.469	0.592	0.357
Value1	0.483	0.901	0.642	0.746	0.485	0.505	0.610	0.448
Value2	0.525	0.927	0.718	0.739	0.696	0.623	0.724	0.676
Value3	0.531	0.910	0.646	0.711	0.608	0.559	0.687	0.556
Assurance1	0.616	0.539	0.879	0.715	0.597	0.505	0.692	0.437
Assurance2	0.487	0.695	0.91 1	0.688	0.61 2	0.467	0.723	0.594
Assurance3	0.545	0.709	0.926	0.713	0.664	0.510	0.735	0.631
Response1	0.479	0.729	0.722	0.848	0.535	0.411	0.720	0.508
Response2	0.606	0.685	0.717	0.884	0.700	0.631	0.760	0.536
Response4	0.551	0.703	0.615	0.905	0.638	0.545	0.768	0.542
Information1	0.377	0.584	0.427	0.567	0.780	0.532	0.629	0.508
Information3	0.621	0.467	0.627	0.545	0.81 2	0.519	0.553	0.536
Information4	0.718	0.528	0.612	0.603	0.823	0.638	0.587	0.542
Delivery1	0.633	0.514	0.510	0.529	0.600	0.855	0.610	0.603
Delivery2	0.660	0.568	0.415	0.497	0.649	0.888	0.556	0.529
Delivery3	0.620	0.515	0.485	0.531	0.558	0.836	0.535	0.393
Quality1	0.664	0.673	0.768	0.762	0.714	0.659	0.902	0.612
Quality2	0.440	0.568	0.634	0.720	0.555	0.413	0.842	0.614
Quality4	0.691	0.727	0.713	0.796	0.683	0.674	0.931	0.657
Tangibles1	0.355	0.562	0.609	0.555	0.506	0.470	0.660	0.841
Tangibles2	0.354	0.534	0.490	0.538	0.666	0.561	0.628	0.901
Tangibles3	0.507	0.513	0.514	0.485	0.665	0.520	0.558	0.874

The final stage of this PLS model analysis is the bootstrapping procedure that is used to assess the significance of the path coefficients. With this method, we are able to root out the paths that are statistically significant, as they empirically support the hypothetic causal relationships. This is not the case with the nonsignificant paths that show no strong causality or give results that contradict the original causal relationships. The bootstrapping procedure creates a large subsample – in this case the recommended number of 5000 – from the original

sample by randomly drawing cases and using replacement to give the bootstrap standard errors. Each of the samples should have the same number of cases as the original. The PLS software then estimates the SEM results from each of the bootstrap samples. Subsequently using these samples allow us to assess the student's t-test values that the bootstrapping procedure draws from the approximated path model coefficients and standard errors. (Hair et al., 2011.)

The bootstrapping results are illustrated in Table 7. The procedure used the recommended amount of 5000 bootstrap samples and the t-test was configured with the specifications according to Hair et al. (2011), which meant that a two-tailed t-test with a significance level of 5%. With this test, the results can be interpreted as such that if the T-statistics shows a value of 1,96 or larger, the path coefficient is considered significant.

Table 7: Bootstrapping results

Path coefficients	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (O/STERR)	P Values
Accessibility -> Service delivery	0,594	0,593	0,100	5,946	0,000
Employee assurance -> Employee response	0,552	0,544	0,131	4,226	0,000
Employee response -> Customer value	0,674	0,670	0,091	7,377	0,000
Employee response -> Service outcome quality	0,714	0,715	0,091	7,841	0,000
Information -> Employee response	0,331	0,342	0,123	2,693	0,007
Service delivery -> Customer value	0,213	0,216	0,095	2,245	0,025
Service delivery -> Service outcome quality	0,230	0,229	0,117	1,968	0,049
Tangibles & visuals -> Service delivery	0,319	0,322	0,114	2,809	0,005

The results show that all of the eight hypotheses introduced in the model have statistical significance as their t-statistic values are over the 1,96 threshold. One hypothesized relation, the positive effect of Service delivery on Service outcome quality is quite close to the threshold value but is slightly above it.

The final results for the hypothesis testing are shown in Table 8. All of the eight relations are supported by the statistical methods used in this section of the study. The strongest relations are between Employee response and Service outcome quality as well as Customer value.

Furthermore, Accessibility is shown to strongly affect Service delivery construct. The relation between Employee assurance and Employee response is also quite strong.

Table 8: Results for the hypothesis testing.

Hypothesis	T Statistics	Result
H1: Tangibles & visuals positively affect Service delivery	2,809	Supported
H2: Accessibility positively affects Service delivery	5,946	Supported
H3: Information positively affects Employee response	2,693	Supported
H4: Employee assurance positively affects Employee response	4,226	Supported
H5: Service delivery positively affects Service outcome quality	1,968	Supported
H6: Employee response positively affects Service outcome quality	7,841	Supported
H7: Service delivery positively affects Customer value	2,245	Supported
H8: Employee response positively affects Customer value	7,377	Supported

The final results suggest that aspects of service quality that are associated with employee attitude and performance are the biggest predictors of customer service quality. Furthermore, the abilities to provide easy access to service personnel and the ability to maintain frequent enough contact with customers are strong predictors of service quality. Interestingly, the lowest t-statistic value is between Service delivery and Service outcome quality. This is a relationship that one would have thought would have more statistical significance in the model.

4.4. Validity and reliability of the study

When considering the validity of a study, both internal and external validity should be taken into account. Internal validity refers to the content while external validity tells us how well the results can be generalized. (Hair et al., 2011.) The internal validity of this study was measured using the PLS analysis results as we looked at the construct validity indicators, in this case both convergent and discriminant validity. While these tools showed that the construct validity of the results was satisfactory, we should not forget to comment on the content validity that is not measured with the above-mentioned indicators. When talking about content validity, the focus is on the indicators used and whether they are appropriate in terms of measuring what is intended. The indicators used in this study where mainly based on two existing quality models and were thus based on existing theory. That being said, the

research was explorative in nature and it did not mimic the existing research model with respect to the inner model (structural model). In other words, this study utilized the metrics from previous studies but deployed them in order to create a new service quality model. Although some of the indicators were deleted when refining the original model, a number of them were associated to each of the latent constructs.

The empirical research and the results are based on a single set of data gathered from the distributors of one case company that represents a certain industry and business model. And as mentioned before, as it seems that the dental healthcare business conducted by the case company is rather relation-based, i.e. there is a strong emphasis on the interpersonal relationships between the employees of both the manufacturing company and the distributor organizations. This is also something that contributes to the idea of this being a rather unique set of data as the way the manufacturer-distributor relationship is formed. It depends on the personal attributes of the people working on the customer interface and also on the philosophy or policies of the organizations. We are the first to recognize that the results of this study are affected by the way that a certain, a rather small group of people in certain few organizations are used to do business and interact with one another.

One aspect that also affects the external validity is the sample size. Although the response rate of our study was satisfactory, the population from which the sample was drawn was helplessly small. One rule of thumb, according to Wong (2013) calculates the minimum sample size as ten times the number of maximum arrows pointing at a latent variable. Even though in our study the maximum number of arrows was four and the sample size was 55, the sample size has to be considered very small.

5. DISCUSSION AND CONCLUSIONS

In this study, we aimed at formulating and subsequently testing a customer service quality model that could be used in a b2b setting when assessing the quality of service between a manufacturing and distribution organization. Based on earlier literature on the subject, we created a research model. This research model was then used to collect data in cooperation with a case company, an international company manufacturing medical devices. Data collected from the case company distributors via an online survey was then analyzed in order to empirically test our hypothesized model. This chapter further discussed the results of our research and aims at summing up this thesis.

5.1. Findings

Numerous different models have been created to measure customer service quality. One challenge to evaluate these findings as a part of this continuum is that there is no one simple definition of service quality on a theoretical level, let alone a concrete model representing the different component of it. In Chapter 2, we examined different service quality models and aggregated them roughly into two groups, the SERVQUAL model and its derivatives and those that aren't based on the idea of service quality being the difference between customer perceptions and expectations. Along with this Gap-approach, there is another well acknowledged paradigm regarding the structure of service quality and that is the division of quality into process and outcome dimensions. Our research model was a classic input-process-output structure that hypothesized service quality as a construct where the service organization has contributing factors that affect the service process, which in turn affect the outcome and customer value. Characteristics of the research model put it in the same caste with other quality models supporting the above-mentioned process vs. outcome quality division. Evaluating the difference between customer perceptions and expectations was discarded while creating the research model because of the ambiguous nature of expectations in service quality context (Grönroos, 2007). Nevertheless, our research model has a strong link to the SERVQUAL model because of the metrics that was in part adopted from it.

The hypothesized quality model consisted of four exogenous constructs that were acted as the input side: Tangibles & visuals, Information, Accessibility and Employee assurance. They

all had strong indicator reliability and were justified in that regard. The significance of the path coefficient varied to some extent, but all of the hypothesized relations proved to statistically exist. The endogenous variables included Service delivery and Employee response, which constituted the process structure of the model, and Service outcome quality and Customer value that represented the output constructs. Probably the most surprising result was the relatively weak positive effect that Service delivery had on the output constructs, compared with the Employee response dimension.

When looking at the coefficients of determination (R^2) for the endogenous variables, we can conclude that the exogenous variables did in fact explain the process dimensions in our model relatively well. Subsequently, the process dimensions explained the output dimensions quite well. All variables had R^2 –values between 0,63 – 0,76 which represent a good result for an exploratory research, even though the threshold value for a substantial result coefficient of determination (R^2) is considered to be 0,75 (Wong, 2013).

In general, the results can be considered good, since we were able to confirm all of the hypotheses that we made as starting points for the empirical testing of our research model. When considering the internal hierarchy of the exogenous variables, it seems justifiable that Accessibility acts as a stronger predictor of service delivery than Tangibles & visuals, as this construct represents aspects of service quality that contribute less to the act of actually servicing the customer. The same sentiment can be used with Employee assurance and Information, as the former has a stronger effect on Employee response than the latter. Nevertheless, it is important to note that both Tangibles & visuals as well as Information variables are quite strong predictors of the associated process structures. These service attributes should not be despised when in pursuit of a comprehensive quality policy.

As the customer service measured in this study represents the traditional interaction between service personnel and customers, it is no surprise that the most significant dimensions of service quality are Employee assurance and Employee response. This strengthens the intuitive notion that employee attitude and actions define to a great extent the customer's perception of the service received.

The biggest challenge with the initial model was with discriminant validity. Corrective measures were made by removing some of the indicators and these corrections improved the validity of the refined model. Even though the refined model validity can be considered good, the initial issues with overlapping indicator cross-loadings suggest that the grouping of different indicators is not always that self-evident. In other words, even though a satisfactory discriminant validity was reached, there are some indicators used in the analysis that can be viewed as rather ambiguous in terms of to what latent variable they should be associated to. This notion does not aim at disputing the results of the quantitative analysis, but is rather a remark that one can make when examining the indicators.

As mentioned in Chapter 1, the manufacturer-distributor relationship is often multidimensional and rather relationship-based. Our findings seem to support this notion, as the construct concerned with employee attitude and actions stand out in our analysis in terms of statistical significance.

5.2. Contributions and suggestions for future research

This research introduces yet another model that can be used to assess service quality. This framework started with existing metrics and reinforced them with a number of customized indicators. Furthermore, these indicators from different sources were shuffled and grouped in the hypothesized model in order to create the wanted dimensions. The results show a statistical significance between the different latent constructs and thus justify the research hypotheses. This study contributes to the research on service quality measurement as it for its part confirms the feasibility of metrics previously developed for measuring customer service quality. It also supports the process vs. outcome structure of customer service quality. Furthermore, the results suggest that the different tiers of service quality have multiple different dimensions as opposed to a single construct of process or output quality.

The study findings also support the paradigm of service quality having both a process dimension and an output dimension. A possible direction for future research would be to refine the model by incorporating expectation indicators to the survey in order to determine what kind of results the Gap-approach would yield with the given model.

Furthermore, the structure of the research model used in this study was partly influenced by the relatively small sample size. With a larger sample, the model could be modified in order to assess relationships between those endogenous variables and the process dimensions that were disregarded in this study. In other words, this study only partially confirms the hypothesized effects of the input dimensions on the process tier of the model.

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APPENDICES

Appendix A: List of PLS-model components

Construct	*Indicator*	*Question*	*Reference/Theoretical background/ Idea source*
Tangibles & visuals	Tangibles 1	PM has visually appealing facilities (trade fair stand, tech training facilities etc.)	Parasuraman et al. (1988)
	Tangibles 2	PM has visually appealing and functional marketing materials & documentation	Parasuraman et al. (1988)
	Tangibles 3	PM has Visually appealing online content (company website, Dealer Support etc.)	Parasuraman et al. (1988); Gounaris (2005)
Accessibility	Accessibility 1	PM has convenient operating hours	Parasuraman et al. (1988)
	Accessibility 2	It is easy to contact PM personnel	Gounaris (2005)
	Accessibility 3	PM employees keep you informed on initial schedules and possible changes	Parasuraman et al. (1988)
	Accessibility 4	I am satisfied with the contact frequency of the Planmeca sales staff	Gounaris (2005)
Information	Information 1	PM has complete and accurate documentation	Gounaris (2005)
	Information 2	It is easy to find correct information from company website or Dealer Support	Parasuraman et al. (1988); Gounaris (2005)
	Information 3	It is easy to obtain product price information	Gounaris (2005)
	Information 4	It is easy to obtain product information	Gounaris (2005)
Employee assurance	Assurance 1	PM employees give you enough personal attention	Parasuraman et al. (1988)
	Assurance 2	PM employees are trustworthy	Parasuraman et al. (1988)
	Assurance 3	PM employees make you feel comfortable in your transactions with the company	Parasuraman et al. (1988)
	Assurance 4	PM employees understand your needs	Gounaris (2005)

Appendix B: List of PLS-model components (continued)

Construct	*Indicator*	*Question*	*Reference/Theoretical background/ Idea source*
Service delivery	Delivery 1	PM has the ability to deliver the order in full	Gounaris (2005)
	Delivery 2	PM has the ability to deliver the order on time	Gounaris (2005)
	Delivery 3	PM has reasonable delivery times	Parasuraman et al. (1988); Gounaris (2005)
	Delivery 4	PM has an easy product ordering process	Parasuraman et al. (1988); Gounaris (2005)
Employee response	Response 1	PM employees are able to fullfill special requests	Gounaris (2005)
	Response 2	Ability to get problems solved with one phone call/contact	Parasuraman et al. (1988); Gounaris (2005)
	Response 3	PM employees are willing to help you with your problems	Parasuraman et al. (1988)
	Response 4	I am satisfied with the way Planmeca employees handle possible complaints	Gounaris (2005)
Service outcome quality	Quality 1	I am satisfied with the level of Planmeca's technical service support	Gounaris (2005)
	Quality 2	I am satisfied with the quality of Planmeca's products	Gounaris (2005)
	Quality 3	PM has provided different services (sales, after sales, tech support etc.) as promised	Parasuraman et al. (1988)
	Quality 4	PM has performed different services (sales, after sales, tech support etc.) right the first time	Parasuraman et al. (1988)
Customer value	Value 1	PM employees are able to help our organization to reach objectives	Gounaris (2005)
	Value 2	PM employees are able to provide added value to our organization	Gounaris (2005)
	Value 3	PM employees are able to contribute to our organization's sales and image	Gounaris (2005)
	Value 4	I am satisfied with the level of PM's product innovation and position of technological leadership in the field	Parasuraman et al. (1988); Gounaris (2005)

Appendix C: The original SERVQUAL instrument (Parasuraman et al., 1988)

THE SERVQUAL INSTRUMENT[a]

DIRECTIONS: This survey deals with your opinions of ——— services. Please show the extent to which you think firms offering ——— services should possess the features described by each statement. Do this by picking one of the seven numbers next to each statement. If you strongly agree that these firms should possess a feature, circle the number 7. If you strongly disagree that these firms should possess a feature, circle 1. If your feelings are not strong, circle one of the numbers in the middle. There are no right or wrong answers—all we are interested in is a number that best shows your expectations about firms offering ——— services.

E1. They should have up-to-date equipment.
E2. Their physical facilities should be visually appealing.
E3. Their employees should be well dressed and appear neat.
E4. The appearance of the physical facilities of these firms should be in keeping with the type of services provided.
E5. When these firms promise to do something by a certain time, they should do so.
E6. When customers have problems, these firms should be sympathetic and reassuring.
E7. These firms should be dependable.
E8. They should provide their services at the time they promise to do so.
E9. They should keep their records accurately.
E10. They shouldn't be expected to tell customers exactly when services will be performed. (−)[b]
E11. It is not realistic for customers to expect prompt service from employees of these firms. (−)
E12. Their employees don't always have to be willing to help customers. (−)
E13. It is okay if they are too busy to respond to customer requests promptly. (−)
E14. Customers should be able to trust employees of these firms.
E15. Customers should be able to feel safe in their transactions with these firms' employees.
E16. Their employees should be polite.
E17. Their employees should get adequate support from these firms to do their jobs well.
E18. These firms should not be expected to give customers individual attention. (−)
E19. Employees of these firms cannot be expected to give customers personal attention. (−)
E20. It is unrealistic to expect employees to know what the needs of their customers are. (−)
E21. It is unrealistic to expect these firms to have their customers' best interests at heart. (−)
E22. They shouldn't be expected to have operating hours convenient to all their customers. (−)

Appendix D: The original INDSERV items (Gounaris, 2005)

The INDSERV items	
Potential quality	Offers full service
	Has required personnel
	Has required facilities
	Has required management philosophy
	Has a low personnel turn-over
	Uses network of partners/associates
Hard process quality	Keeps time schedules
	Honors financial agreements/stays in budgets
	Meets deadlines
	Looks at details
	Understands our needs
Soft process quality	Accepted enthusiastically
	Listen to our problems
	Open to suggestions/ideas
	Pleasant personality
	Argue if necessary
	Look after our interests
Output quality	Reaches objectives
	Has a notable effect
	Contributes to our sales/image
	Is creative in terms of its offering
	Is consistent with our strategy