The determinants of customer satisfaction and possible moderating effects in the telecom sector – an empirical study

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Erasmus University Rotterdam
Erasmus School of Economics (ESE)

Author
Marc Vermaat
401017

Supervisor
Spyridon Stavropoulos

Second Assessor
Martijn Hendriks

Table of Contents

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Abstract

Customer satisfaction has a strong positive effect on firm performance which makes it very relevant to know which factors influence customer satisfaction. This paper studies the effect of several determinants on customer satisfaction in the telecom industry, while taking possible moderating effects into account. To do so, this study analyses 314,472 customer satisfaction surveys collected from a Dutch telecom provider between January 2015 and May 2018, combined with additional information about the (region of the) stores. Using a multiple linear regression model, this study finds significant effects of the solution, different employee characteristics and the physical environment on customer satisfaction. In addition, significant evidence is found that the observed effects are moderated by the product type, the income level of the store region and urbanity of the area of the store.

1. Introduction

In the last 20 to 30 years, the effect of customer satisfaction on the performance of a company has been researched extensively. Most of these studies find a strong positive relationship between customer satisfaction and the performance of a firm, usually measured by profits. This effect especially holds for companies operating (partially) in a service-sector like telecom or banking (Anderson, Fornell, & Lehman, Customer Satisfaction, Market Share, and Profitability: Findings from Sweden, 1994) (Hallowell, 1996) (Kyung-A & Dae-Young, 2013) (Reichheld, Markey, & Hopton, 2000) (Sasser, Heskett, Jones, Loveman, & Schlesinger, 1994). According to a study conducted by Reichheld, a 5% improvement in defection rates increases profits by 25% to 100%. Reichheld lists four main reasons for this relationship: acquiring new customers entails certain one-time costs, the operating costs of a customer decline over time, companies can charge a premium for their products from satisfied customers and satisfied customer create free advertising (Reichheld F. , 1996) (Reichheld & Sasser, 1990).

The insight that customer satisfaction improves firm performance has caused a change in company strategies with firms starting to focus more on customer satisfaction (Kim, Ok, & Canter, 2012). However, while a lot of research has been conducted on the effect of customer satisfaction on firm performance, there is relatively little research on how customer satisfaction can be improved while taking different aspects and moderating effects into account. Because of the positive effects of satisfaction on firm performance, it is relevant to know on which factors companies should focus in order to effectively improve customer satisfaction. Profound knowledge of the impact of different determinants on customer satisfaction can help companies optimizing the allocation of their resources and focus the training of their employees on skills that matter most. The outcomes of this paper will therefore have consequences for the priority-setting and strategy development of companies.

This paper hypothesises that the outcome of the service encounter, better waiting time, the physical environment of the service encounter and employee characteristics all have a positive effect on customer satisfaction. The latter, employee characteristics, includes employee friendliness, knowledge and question handling. In addition, potential moderating effects of the product type, income level and urbanity of the region on the effect of these variables are assessed. To test these hypothesised expected effects, this study analyses over 300,000 customer satisfaction surveys collected from KPN, a telecom provider in the Netherlands.

The main objective of this paper is twofold. First, this study strives to give more insight in the different factors that influence customer satisfaction in the telecom sector. Second, this research aims to propose a customer satisfaction model which can be used as a basis for further research into this topic.

In brief, this paper finds significant positive effects of the service outcome, the three employee characteristics (friendliness, knowledge and question handling), better waiting time and the physical environment on customer satisfaction. Interestingly, both employee characteristics and waiting time have a stronger impact on the customer satisfaction than the outcome of the service. As hypothesised, the effect of the different determinants differs by product type, income level and the urbanity of the region.

This research contributes to the existing literature in two ways. First, it assesses the effects on customer satisfaction of many different aspects of the service encounter (outcome of the service encounter, employee characteristics, waiting time and the physical environment)

while taking possible moderating effects into account, this has not yet been done. Second, based on previous researches and own reasoning, this paper proposes a customer satisfaction model which can be used as a basis for further research into this topic.

The remainder of this paper is structured as follows. Section 2 discusses the different aspects of customer satisfaction and the existing literature on this topic. Section 3 discusses the proposed customer satisfaction model and describes the hypotheses and their theoretical underpinning. Section 4 explains the data, the variables used in the model and the empirical method used to assess the hypothesised effects. The results of the model and the robustness check are presented in section 5 and are discussed in section 6. Section 7 discusses the limitations of the study and finally, section 8 offers a brief summary of the main conclusions and the contributions to the existing literature.

2. Theoretical background

This section is divided into four different subsections. The first subsection discusses the differences between customer satisfaction and customer loyalty and the ways in which satisfaction can be measured. The second subsection lists the most important conclusions about the effect of customer satisfaction on firm performance. The third section discusses the existing literature into the determinants of customer satisfaction and the section concludes with a short summary.

2.1 Customer satisfaction and customer loyalty

Customer satisfaction is sometimes mixed up with customer loyalty. Although both are tightly related, there is an important difference between them. In line with Anderson and Fornell, a satisfied customer is defined as a customer whose perceived quality of the whole interaction with the company meets or exceeds the expected quality (Anderson & Fornell, 1994). Following Dick and Basu, a loyal customer is defined as a customer who (1) has a more favourable attitude towards a brand (as compared to other alternatives) and who (2) shows repeat patronage (Dick & Basu, 1994). In short: while a customer has to be satisfied with the quality in order to become a loyal customer, a satisfied customer is not by definition a loyal customer (Garrity, 2010).

In order to assess the effects of different factors on customer satisfaction, a clear measure of satisfaction is essential. In 1985, Parasuraman, Zeithaml and Berry laid the basis for future empirical research into customer satisfaction by introducing SERVQUAL, an instrument designed to measures service quality. This measure defines customer satisfaction as the difference between the customers' expectations and the actual experience of the customer. According to Parasuraman et al, a customer is satisfied when the experienced service quality meets or exceeds the customer's expectation. The measure is based on ten dimensions that consumers use to evaluate service quality and is since its introduction used by many researchers as a basis for empirical models (Parasuraman, Zeithaml, & Berry, 1985) (Veloso, Ribeiro, Alves, & Fernandes, 2017).

One of the most widely used measures of customer satisfaction is the Net Promotor Score (NPS), introduced by Reichheld in 2003 (Lane, et al., 2014) (Reichheld F. , 2003). The score uses a single question (*How likely are you to recommend our company to a friend or*

colleague?) which customers answer on a 0 (very unlikely) to 10 (very likely) rating scale. Based on this score, consumers are divided into three groups:

Promoters (NPS of 9 or 10)
> These customers are loyal and enthusiastic. They adore you and actively recommend you.

Passives (NPS of 7 or 8)
> These customers are satisfied, but unenthusiastic. They are neutral.

Detractors (NPS from 0 to 6)
> These customers are unhappy. Often, they are frustrated and specifically do not recommend you to others.

The overall Net-Promoter Score of a company is calculated by subtracting the percentage of detractors from the percentage of promoters. According to Reichheld, this score reflects both the emotional and rational dimensions of the relationship between the customer and the company (Garrity, 2010) (Peltier & Schultz, 2013) (Reichheld F. , 2003) (Reichheld F. , 2006).

2.2 Effect of customer satisfaction

Most researches that assess the relationship between customer satisfaction and firm performance find a strong positive effect of customer satisfaction on firm performance, usually measured by profits (Anderson, Fornell, & Lehman, Customer Satisfaction, Market Share, and Profitability: Findings from Sweden, 1994) (Hallowell, 1996) (Kyung-A & Dae-Young, 2013) (Reichheld, Markey, & Hopton, 2000) (Sasser, Heskett, Jones, Loveman, & Schlesinger, 1994). According to a study conducted by Reichheld, a 5% improvement in defection rates increases profits by 25% to 100%. The study lists four main reasons as to why customer loyalty increases profits. First of all, acquiring new customers entails certain one-time costs, like advertising and promotion costs. Second, the operating costs of a customer decline over time because the customer better understands the product or service and therefore takes less of the company's time. Third of all, loyal customers are less sensitive to price. Because of that, companies can often charge a premium for their products. Lastly, loyal customers tell other people about the company and hereby create free advertising and new patronage (Reichheld F. , 1996) (Reichheld & Sasser, 1990).

2.3 Determinants of customer satisfaction

Studies that examine which factors influence customer satisfaction can be divided into two groups. One group reviews all sectors simultaneously, hereby creating a broad view of the basic determinants that influence satisfaction. The other group of researches examines specific sectors, which creates a more detailed image of the determinants of customer satisfaction in a certain sector. Based on own reasoning and the models discussed below, this paper proposes an own customer satisfaction model.

2.3.1 Broad customer satisfaction models

In 1992, Claes Fornell designed the first cross-sectoral, nation-level customer satisfaction index: the Swedish Customer Satisfaction Barometer (SCSB). This index measures customer satisfaction based on three different facets of satisfaction: (1) general satisfaction, (2) confirmation of expectations and (3) the distance from the customer's hypothetical ideal product (Fornell C. , 1992). The introduction of the satisfaction index in Sweden was soon

followed by other national indices in, among others, Germany, the United States, New Zealand, Norway and Korea. Of these models, the American Customer Satisfaction Index (ACSI) and the Norwegian Customer Satisfaction Barometer (NCSB) are the most sophisticated and influential (Fornell, Johnson, Anderson, Cha, & Bryant, 1996) (Vieira & Gava, 2007) (Yang, Tian, & Zhang, 2004).

American Customer Satisfaction Index

The American Customer Satisfaction Index (ACSI) is an improved version of the Swedish Index and is developed by the same author who designed the Swedish Index. The ACSI uses three antecedents of customer satisfaction: perceived quality, perceived value and customer expectations (see Figure 1). Perceived quality is defined as the customer's evaluation of the recent consumption experience. Perceived value is the customer's evaluation of the level of product quality relative to the price paid. Customer expectation is represented both by the customer's expectations before the consumption and the customer's forecast of the supplier's ability to deliver quality in the future. Fornell et al. find two effects of increased customer satisfaction: decreased customer complaints and increased customer loyalty (Fornell, Johnson, Anderson, Cha, & Bryant, 1996) (Yang, Tian, & Zhang, 2004).

Customer satisfaction is operationalized by three questions: the overall satisfaction of the customer, the performance of the company versus the customer's ideal service provider and whether the performance falls short or exceeds the expectations of the customer (ACSI, 2018)) (Johnson, Gustafsson, Andreassen, Lervik, & Cha, 2001).

Figure 1: The American Customer Satisfaction Index
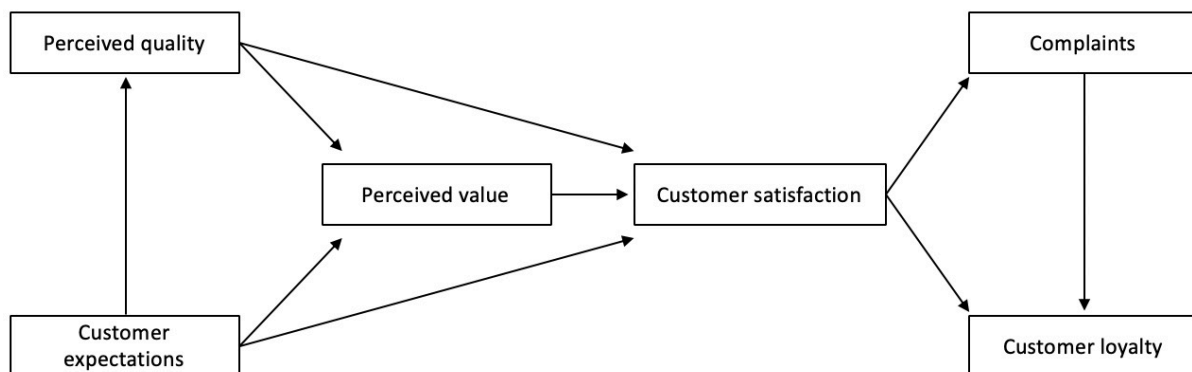
While the American Satisfaction Index laid the basis for many national satisfaction indices, it has some limitations which make the model unsuitable to use for a detailed examination of the determinants of customer satisfaction.

First of all, the ACSI defines very broad variables that influence customer satisfaction. This makes it impossible to assess the effect of specific factors, for instance the effect that an employee has on customer satisfaction. Besides broadly defined variables, the ACSI does not take moderating effects into account. Therefore, the effects of the examined variables on satisfaction are expected to be the same for all individuals, sectors and situations, which is not likely.

Norwegian Customer Satisfaction Barometer (NCSB)

The original Norwegian Satisfaction model was identical to the American model with the exception that it included corporate image and its relationships to customer satisfaction and

customer loyalty. To keep up with the evolution in the marketing from a transactional orientation to a relational orientation, the NCSB model was expanded over time to the model shown in Figure 2 (Johnson, Gustafsson, Andreassen, Lervik, & Cha, 2001).

The Norwegian Satisfaction Barometer measures customer satisfaction in the same way the American Satisfaction Index assesses satisfaction (overall satisfaction, performance versus ideal service and performance versus expectations). The quality drivers of the NCSB are partly based on focus group interviews with customers and managers and partly based on the SERVQUAL instrument, developed by Parasuraman et al. Combining these led to five factors as drivers for customer satisfaction, consisting of: tangibles, reliability, responsiveness, assurance and empathy (Andreassen & Lindestad, 1998) (Johnson, Gustafsson, Andreassen, Lervik, & Cha, 2001) (Vieira & Gava, 2007).

Figure 2: The Norwegian Customer Satisfaction Barometer
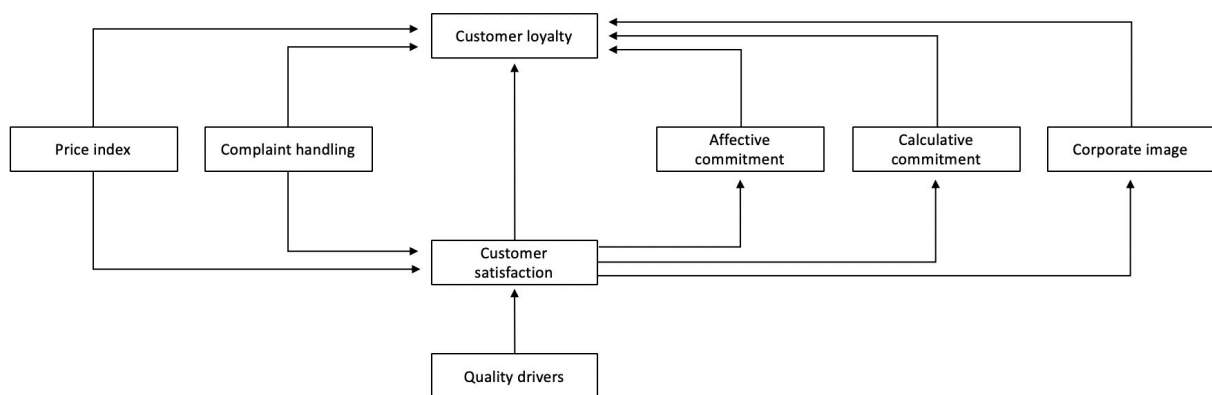
There are two main limitations that make this model unsuitable to estimate the effect of several factors on the customer satisfaction in the telecom industry. First of all, the model focuses on sectors that solely offer a service without a product. Because of this, the model does not take the quality of the outcome into account which is essential in this paper because the outcome of the service encounter in the telecom sector is not just intangible but also partly tangible and is therefore expected to influence the satisfaction. Second, like the ACSI, the model does not take moderating effects of different factors into account. Because of this, the effects of the different determinants are expected to be the same in every situation, which is not likely.

2.3.2 Sector specific customer satisfaction models

Jamal and Naser (2002) are one of the first who empirically test the relationship between several variables and customer satisfaction in one specific sector. They assess the effect of two dimensions (core and relational) on customer satisfaction in the banking sector. The authors define the core dimension as the outcome of the service encounter and the relational dimension as the customer-employee relationship. To measure the two dimensions and the customer satisfaction, a questionnaire is designed. The survey is randomly distributed to customers who visit a specific branch of the bank and is answered by 167 respondents (Jamal & Naser, 2002). While the banking industry is a different sector than the telecom sector, it has some similarities with the telecom sector. Both sectors offer a product (bank account or mobile contract) which is delivered by a service encounter. Following Jamal and Naser, this

paper treats both the core quality and the relational quality as important influencers of customer satisfaction.

The strength of this study is that it takes a lot of different variables into account to assess the determinants of customer satisfaction in a specific sector. However, there are some weaknesses that make the conclusions less convincing. One limitation is the data that the authors use. The conclusions are based on 167 surveys which are filled in by customers at one location on one specific day. Besides a small sample size, the specific branch and time make it impossible to control for variations over time and place. Another limitation is that the authors do not use moderating variables but assume that the effect of the different factors is not affected by the situation.

In a study from 2006, Froehle assesses the effect of characteristics of customer service employees on customer satisfaction in the Internet Service Provider (ISP) industry, while taking the moderating effects of different channels into account (see Appendix A). The primary dataset used to test the model consists of customers of a large US-based Internet Service Provider who used human-based customer support less than 24 hours prior to being invited to participate in the survey. The author finds that knowledge, preparedness and thoroughness of an employee have significant effects on customer satisfaction and that this effect is not significantly moderated by the channel that the customer uses (Froehle, 2006).

What makes this research interesting is the fact that it examines a specific part of the customer satisfaction: the employee characteristics while also taking moderating factors into account. At the same time, the fact that the study focuses at such a specific part of the customer satisfaction is also a drawback because it does not consider some relevant variables.

2.4 Conclusion literature review

Many studies find a strong positive effect of customer satisfaction on firm performance, especially in sectors that combine products and services. Several researches have laid a strong basis for future research into the factors that influence customer satisfaction, mainly by proposing different customer satisfaction measures and models. Although these studies lay a good foundation, further research is necessary in order to create more specific and reliable insights into the factors that influence customer satisfaction. The main limitations of the studies into customer satisfaction are (a combination of) a very small sample size, data over a short period of time, a lack of relevant variables and not taking moderating effects into account.

3. Conceptual framework and hypotheses

As written before, the goal of this paper is to assess the different factors that influence customer satisfaction in the telecom industry. To support this study, a customer satisfaction model is proposed. The hypothesised model combines own reasoning with insights from different models and researches discussed in the literature review. A specific part of this model is empirically tested. This section is divided in two subsections: the first subsection presents the proposed model, the second section discusses the scope of the paper and the hypotheses.

3.1 Proposed model

Figure 3 shows the proposed model of the relationships between several variables and customer satisfaction. While this model is a vicious circle, the expected quality can be considered as the starting point when a customer enters a store for the first time. When the customer interacts with the company, he starts this interaction with a certain expectation about the service quality that the company will deliver. The delivered quality can either meet, fall behind or exceed the expectations of the customer. If a consumer has high expectations, the delivered quality has to be higher in order to satisfy the customer. Therefore, the expected quality is hypothesised to have a negative effect on the perceived quality.

In line with other researches, both the perceived quality and the core quality are expected to have a positive effect on the customer satisfaction (Jamal & Naser, 2002) (Martinelli & Balboni, 2012) (Yang, Tian, & Zhang, 2004). This relationship is also in line with intuitive reasoning: when a customer is satisfied with the quality of the product and service, he is more likely to be satisfied with the company overall. As shown in the model (Figure 3), the perceived quality is expected to be affected by so called *key drivers*. These *key drivers* are factors that influence the perceived value. The fact that the perceived quality is expected to have a positive effect on customer satisfaction makes it very relevant to know which factors make up the *key drivers* and what the effect of these factors is on the perceived value. This paper proposes five *key drivers* that are all expected to have a positive effect on perceived quality: employee knowledge, employee friendliness, question handling, greeting and waiting time. For a more detailed explanation of the *key drivers*, see the discussion of hypotheses 2, 3 and 4.

Customer satisfaction is hypothesised to have a positive effect on *customer loyalty*, *expected quality* and *positive word of mouth*. The positive effect of customer satisfaction on customer loyalty is in line with many researches, which empirically show that a more satisfied customer is more likely to become a loyal customer (Ball, Coelho, & Vilares, 2006) (Brexendorf, Mühlmeier, Tomczak, & Eisend, 2010) (Dagger & David, 2012) (Dick & Basu, 1994) (Lee S. Y., 2017) (McDougall & Levesque, 2000) (Oliva, Oliver, & MacMillan, 1992) (Parasuraman, Zeithaml, & Berry, 1985) (Shin, 2015). The expected positive effect of *customer satisfaction* on *positive word of mouth* is based upon research by Klopotan et al. and Reichheld and Sasser, both studies find that when a person is satisfied with an experience, he is more inclined to tell others about his experience (Klopotan, Vrhovec-Žohar, & Mahič, 2016) (Reichheld & Sasser, 1990). Following Zameer et al. and logical reasoning, *positive word of mouth* is expected to increase *corporate image* because of the favourable recommendations of other customers (Zameer, Wang, Yasmeen, Mofrad, & Waheed, 2018). Finally, *customer satisfaction* is predicted to positively affect *expected quality*. When a consumer had pleasant experiences during prior visits, he has higher expectations about the service quality of the company.

Figure 3: Proposed model of customer satisfaction
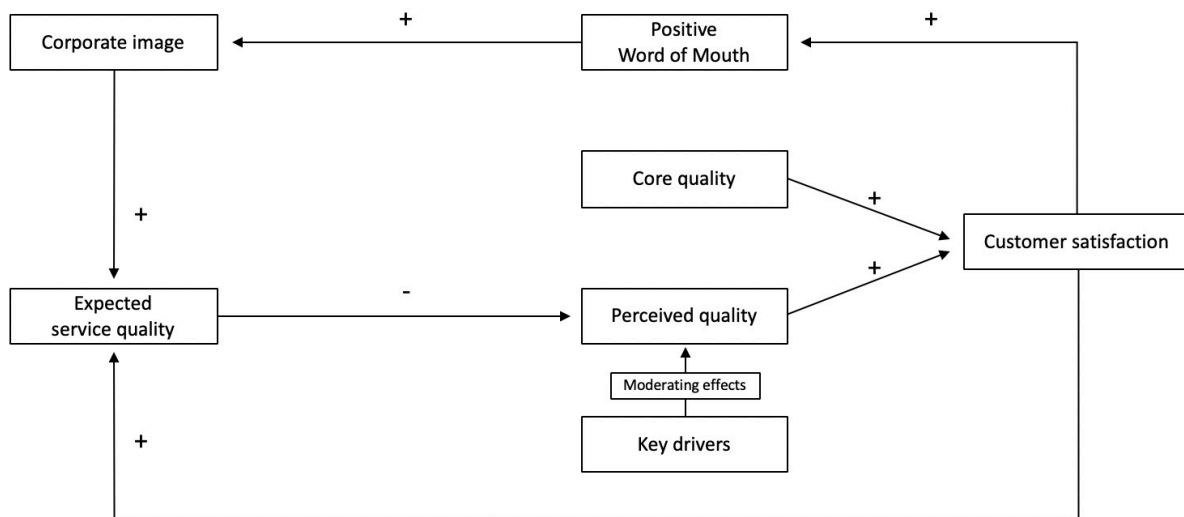
3.2 Hypotheses

Because the main focus of this research are the determinants of customer satisfaction, this paper will concentrate on a specific part of the model (see Figure 4). This part describes the effect of the core quality and perceived quality on customer satisfaction and takes possible moderating effects into account.

Figure 4: Focus of this study
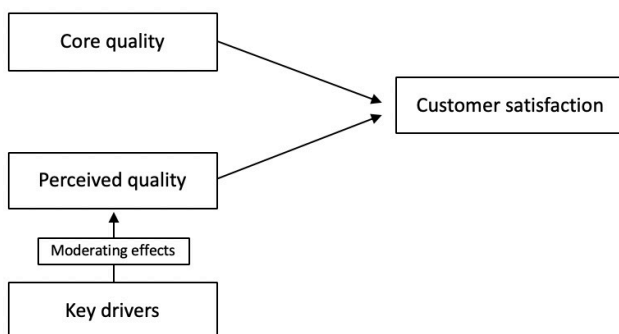
Core quality

Most studies that examine the effect of different determinants on customer satisfaction name core quality as one of the main determinants of satisfaction (Bayraktar, Tatoglu, Turkyilmaz, Delen, & Zaim, 2012) (Grönroos, 1984) (Martinelli & Balboni, 2012) (Parasuraman, Zeithaml, & Berry, 1985). McDougall and Levesque define core quality as the outcome of the service encounter and measure this by asking the customer to rate the solution on a 0 (very bad) to 100 (ideal) rating scale. The authors find evidence that satisfaction is directly dependent on the core quality of the service in all of the four service sectors that are examined in their research (McDougall & Levesque, 2000). In a study from 2002, Jamal and Naser assess the factors that influence customer satisfaction in the banking sector. They find a positive significant effect of the quality of the service outcome on customer satisfaction (Jamal & Naser, 2002).

In line with McDougall and Levesque, this study defines core quality as the outcome of the service encounter. In line with logical reasoning and the studies described above, the core quality is expected to increase customer satisfaction. Therefore, the following hypothesis will be tested:

H1: The service outcome has a positive effect on customer satisfaction.

Perceived quality
Several papers find that the perceived quality positively influences customer satisfaction (Fornell C. , 1992) (Yang, Tian, & Zhang, 2004). This paper defines perceived quality as the way in which the customer perceives the quality of the service encounter. In line with among others Bitner, Värlander and Yakhlef and Lehtinen and Lehtinen, three aspects of perceived quality are defined: interaction quality, waiting time and the physical environment (Bitner M. J., 1990) (Bitner M. , 1992) (Brady & Cronin, 2001) (Lehtinen & Lehtinen, 1982) (Värlander & Yakhlef, 2006). Based on these researches, the three aspects mentioned above are expected to give a reliable approximation of the perceived quality. Therefore, the effect of key drivers related to interaction quality, waiting time and the physical environment on customer satisfaction are assessed.

Interaction quality
In line with Alexandris et al. and Brady and Cronin, interaction quality is defined as a customer's experience as a result of the interaction with the human element of the service organisation (Alexandris, Kouthouris, & Meligdis, 2006) (Brady & Cronin, 2001). Froehle (2006) shows that customer satisfaction is influenced by different characteristics of service personnel, among others knowledge and thoroughness (Froehle, 2006). According to Pugh, the display of positive emotion by employees is positively related to customers' positive affect following service encounters and to their evaluations of service quality (Pugh, 2001). This finding is supported by studies from Lin and Lin and Zameera et al., who find that a more positive attitude of a service employee increases the satisfaction of customers (Lin & Lin, 2011) (Zameer, Wang, Yasmeen, Mofrad, & Waheed, 2018). Evanschitzky et al. assess the effect of the friendliness of an employee and find a positive effect of this characteristic on customer satisfaction (Evanschitzky, Sharma, & Prykop, 2012). In a similar research, Choi and Kim find that various aspects of interaction quality such as friendliness and politeness are considered critical in driving customer satisfaction (Choi & Kim, 2013).

Based on the findings of the papers discussed above and in line with logical reasoning, this paper defines three employee characteristics that are expected to have a positive effect on customer satisfaction: *knowledge*, *friendliness* and *question handling*. This will be tested with the following hypothesis:

H2: Employee characteristics have a positive effect on customer satisfaction

Hypothesis 2 is split up in three separate sub-hypotheses:
H2.1: Employee knowledge has a positive effect on customer satisfaction
H2.2: Employee friendliness has a positive effect on customer satisfaction
H2.3: Question handling has a positive effect on customer satisfaction.

Waiting time

In line with logical reasoning, several researches find that a better perceived waiting time has a positive effect on customer satisfaction (Dada, Kalwani, & Kumar, 1997) (Chung, Liberatore, Luo, Nydick, & Sloane, 2004) (Gail & Scott, 1997) (Katz, Larson, & Larson, 1991) (Lee & Lambert, 2001) (Pruyn & Smidts, Effects of waiting on the satisfaction with the service: Beyond objective time measures, 1998). As the term already implies, perceived waiting time is not the absolute waiting time but the waiting time as perceived by the customer.

A study from Chebat et al. find that greeting a customer when he enters the store increases the customer satisfaction (Chebat, Filiatrault, & Gelinas, 1993). A study from Baker and Cameron three years later finds similar results (Baker & Cameron, 1996). Based on the studies discussed above, this paper will test the following hypotheses:

> *H3: A better perceived waiting time increases customer satisfaction*
> *H4: Better greeting has a positive effect on customer satisfaction*

Physical environment

In line with Kotler (1973), the physical environment is defined as the tangible or physical components of the service product that provide nudge to consumers and create an immediate perceptual image to a customer's mind. It includes the exterior and interior design and ambient conditions (Kotler, 1973) (Reimer & Kuehn, 2005).

In the mid 1980s, two separate studies found that the interior of a store is, after brand name, the most heavily assed in order to evaluate merchandise quality (Darden & Schwinghammer, 1985) (Mazursky & Jacob, 1986). In two other studies, Bitner finds that the physical surroundings of a service encounter positively influences the customer's evaluation of the service encounter (Bitner M. J., 1990) (Bitner M. , 1992). This finding is supported by studies from among others Baker et al. (1994) and Värlander and Yakhlef (2006). They find that combinations of specific elements of retail store environments influence a consumer's inferences about service quality (Baker, Grewal, & Parasuraman, The influence of store environment on quality inferences and store image, 1994) (Dabholkar, Rentz, & Thorpe, 1996) (Värlander & Yakhlef, 2006) (Wakefield & Blodgett, 1999).

In line with the studies described above, the physical environment is expected to have a positive effect on customer satisfaction. Therefore, the following hypothesis will be tested:

> *H5: The physical environment has a positive effect on customer satisfaction.*

Moderating effects

As described in the theoretical background, a limitation of most papers that assess the determinants of customer satisfaction is the absence of moderating factors. Because it is unlikely that the effect of the assessed determinants is the same in all situations, this paper takes three moderating factors into account: product type, income level and the urbanity of the store area.

Product type
Customers visit a physical store with questions about numerous products. Some of these questions are considered as being simple requests, for instance buying a phone cover, while other questions, like purchasing a mobile phone, are regarded as being more difficult questions. Because customers have different expectations for different questions, the product type is expected to influence the effect of the employee characteristics and waiting time on customer satisfaction. For instance, when a customer has a relative simple question, it is likely that he values the knowledge of an employee less than when he has a more difficult question. The precise effect of the product type is not clear, which leads to the following hypotheses:

> *H6: The product type moderates the effect of the employee characteristics on customer satisfaction*
> H7: *The product type moderates the effect of waiting time on customer satisfaction*

Income level
In a study from 2016, Klopotan, Vrhovec-Žohar and Mahič find that customers with different income levels value different aspects of the service delivery differently. For instance, customers with a high income, value the kindness of a salesperson more than customers with a lower income (Klopotan, Vrhovec-Žohar, & Mahič, 2016). Based on the findings from Klopotan et al, it is expected that the income level in the area of a KPN store moderates the effect of employee characteristics. Furthermore, this paper expects that people with high income value time differently than people with a lower income. To test this, the following two hypotheses are formulated:

> *H8: The income level in the area around the store moderates the effect of the employee characteristics on customer satisfaction*
> *H9: The income level in the area around the store moderates the effect of waiting time and greeting on customer satisfaction*

City
Many studies find differences between urban and rural regions and link this to a difference in happiness of people living in urban areas and people living in rural regions (Adams & Serpe, 2000) (Balducci & Checchi, 2009) (Berry & Okulicz-Kozaryn, 2011) (Evans, 2009) (Lederbogen, et al., 2001) (Okulicz-Kozaryn & Mazelis, 2018). Based on the findings of these researches, this paper expects that the effects of the factors influencing customer satisfaction differs between urban and rural areas. To test this, the following two hypotheses are defined:

> *H10: The urbanity of the area of the store moderates the effect of the employee characteristics on customer satisfaction*
> *H11: The urbanity of the area of the store moderates the effect of the waiting time and greeting on customer satisfaction*

4. Data and methodology

This section is divided in two parts. The first subsection discusses the data used in this study, the main variables of interest used in the model and presents descriptive statistics of the data. The second subsection discusses the models that are used to test the hypotheses.

4.1 Data

The primary database used in this study consists of customer satisfaction surveys which were sent to customers who visited a KPN store up to 3 days prior. The survey consists of 7 questions, which are answered on a 1 - 5 (drivers) or 0 - 10 (Net Promotor Score) rating scale (Table 5, Appendix B). The surveys are collected at store-level, because of this the data cannot be linked to specific customers and thus, individual attributes like age and gender are unknown.

The main database is combined with two other datasets to create the final database which is used to test the hypotheses. One of the additional datasets is retrieved from KPN as well and contains information about the different KPN stores like the monthly number of customers, FTE, the store formula and the location of the store. The other database is collected from CBS (Centraal Bureau voor de Statistiek), a statistics bureau financed by the state which performs public service tasks (CBS, 2018). This database contains information about the area around the KPN stores, including the average income, urbanity and the total number of residents in a certain area. The database contains a total of 314,472 surveys, collected from the 1st of January 2015 until the 31st of May 2018 from 114 stores.

Variables

The dependent variable (*NPS*) is the Net Promoter Score of the individual customers (see customer satisfaction, page 4 and 5). The NPS is based on a single question: *"How likely are you to recommend our company to a friend or colleague?"*, which customers answer on a 0 (very unlikely) to 10 (very likely) scale. Following among others Reichheld, a higher value of the Net Promotor Score indicates that the customer is more satisfied with the service (Reichheld F. , 2003). The fact that the dependent variable *NPS* is based upon a rating scale makes it an ordered categorical variable.

To test the first six hypotheses, the answers to six questions from the survey are used (see Appendix B). These questions ask the customer to evaluate the *quality of the solution*, *employee knowledge*, *employee friendliness*, *question handling*, *waiting time* and *greeting* and rate them on a 1 (very bad) to 5 (very good) rating scale, also known as a Likert scale.

To approach the physical quality of the store, the store formula is used. KPN has three different store formulas: regular stores, KPN 2.0 stores and KPN XL stores. The KPN 2.0 stores are specifically designed to increase the customer experience and therefore have a better physical quality than regular- and KPN XL stores (KPN, 2016). To assess the effects of the physical quality, a dummy variable (*KPN 2.0*) is created which takes value 1 when the store is a KPN 2.0 store and which takes value 0 otherwise.

The CBS indicates the urbanity of a region on a 1 (very urban) to 5 (very rural) scale. To assess the effects of the urbanity of the region of the store on customer satisfaction, a dummy variable (*city*) is created which takes value 1 if the average urbanity rating in the region of the store is smaller than 2 and which takes value 0 otherwise.

CBS divides the income level of an area on a 1 (low income) to 9 (high income) scale. Based on this score, a dummy variable (*high income*) is created to assess the effects of high income on customer satisfaction. The dummy variable takes value 1 if the average income in the store region is classified as 7 (above middle) or higher.

For every customer interaction, employees write a short description of the type of the interaction. Based on this description an unordered categorical variable (*product type*) is created. The variable defines four different categories: *mobile*, *broadband*, *broadband and mobile* and *other* to distinguish four product types. The base category of the categorical variable product type is mobile.

To control for unobserved changes over time and to control for unobserved differences between stores, time- and store-dummies are added to the model. This allows for a more precise examination of the effect of the variables of interest. The time-dummies consist of monthly and yearly dummies to control for both seasonal as structural changes respectively.

To check for potential multicollinearity within the independent variables, a correlation table is presented in Table 1 (the VIF values are presented in Table 6 in Appendix C). The descriptive statistics of the main variables in the model are presented in Table 2.

Table 1: correlations of the main explanatory variables (N = 314.501)

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Solution	1.00					
(2) Employee knowledge	0.74	1.00				
(3) Employee friendliness	0.78	0.69	1.00			
(4) Question handling	0.76	0.78	0.69	1.00		
(5) Waiting time	0.31	0.31	0.31	0.29	1.00	
(6) Greeting	0.44	0.43	0.45	0.40	0.55	1.00

Table 2: Summary statistics

	Mean	Std. Dev.
NPS	8.22	1.56
Solution	4.68	0.62
Employee knowledge	4.62	0.71
Employee friendliness	4.76	0.54
Question handling	4.65	0.74
Waiting time	4.24	1.02
Greeting	4.46	0.88

4.2 Methodology

Main model

As mentioned before, the dependent variable, *Net Promotor Score*, is an ordered categorical variable. Categorical variables have no cardinal significance, meaning that the difference between a score of 1 and 2 might be different than the difference between a score of 9 and 10. Stevens started an ongoing debate when he stated that variables with no cardinal significance cannot be assessed with, among others, a linear regression (Stevens, 1946). Some researchers agreed with Stevens but the idea also received a lot of criticism. Among others Jonhson and Creech, Gaito and Lord stated that "*the numbers don't know where they came from*" and that ordinal variables of at least five categories are "*an ordinal approximation of a continuous variable*" (Gaito, 1980) (Johnson & Creech, 1983) (Lord, 1953) (Norman, 2010) (Sullivan & Artino, 2013). In line with these researchers, this paper treats the Net Promotor Score and the six key variables as an approximation of continuous variables.

To test the hypotheses, this paper uses a multiple linear regression model as main model. This regression model estimates the effect of several explanatory variables on the response variable (Moore, McGabe, Alwan, Craig, & Duckworth, 2011). To test the different hypotheses, 5 models are used. First, the effects of the key drivers are tested in a base model without taking the hypothesised moderating effects into account. Then, the three moderating variables are assessed in three separate models in order to make sure that the moderators do not affect each other and to test whether the coefficients of the key drivers change a lot. Finally, the significant moderating effects are added to the base model in order to create the final model which will be used to test the hypotheses. To make sure that all variables that might influence customer satisfaction are included in the final model, variables with a P-value smaller than 0,1 are included in the model. In order to make sure that the moderating effects show the difference in the effects of the determinants, the moderators (*product type*, *high income* and *city*) are added as independent variables as well.

The multiple linear regression makes three key assumptions about the data, namely: the variance of the error terms is similar across all the independent variables (homoscedastic error terms), the residuals are normally distributed and the explanatory variables are not highly correlated (Dunteman & Ho, 2006). Following Stock and Watson (2015), this paper assumes heteroscedasticity of the error terms, therefore, the option *robust* is added to the models to make sure that Stata accounts for heteroscedasticity (Stock & Watson, 2015). While there is no strict rule to determine whether there is too much collinearity between two variables, a commonly used rule of thumb states that a variance inflation factor (VIF) of 10 or higher indicates serious multicollinearity (this rule appears in both scholarly articles and advanced statistical textbooks) (O'Brien, 2007). A VIF of at least 10 corresponds with a correlation of 0,90 or higher. As shown in Table 1, there is no correlation that exceeds this threshold, therefore, following this rule of thumb, this research assumes that the assumption of no multicollinearity holds. Based on the Central Limit Theorem, this paper assumes that the sample size is large enough (more than 300,000 observations) for the distribution of the residuals to approach normality (Abadir & Magnus, 2004) (Lumley, Diehr, Emerson, & Chen, 2002) (Miao, 2008).

Robustness check

This paper includes a robustness check to test whether the conclusions of the model changes when the dependent variable is not treated as a continuous variable but as an ordered categorical variable. To do so, this paper uses an ordered probit model that uses the same variables as the final multiple regression model.

5. Empirical results

This section is divided into four subsections. The first subsection shortly explains the results of the base model and the moderating effects that are included in the model. The second subsection discusses the effects of the main variables of interest in the final model. The third subsection examines the moderating effects and the last part of this section provides a robustness check of the empirical results.

5.1 Results separate moderating effects models

Table 3 displays the results of the base model and the three models in which the moderating effects are tested separately. The first thing that is noticed is that the sign, magnitude and significance of the six key drivers do not change considerably when the different moderating effects are added. This implies that the moderating effects do not affect the overall effects of the variables but show the difference in the effects of the determinants in different situations. Based on the second model, the moderating effects of *product type* on *friendliness*, *question handling* and *waiting time* are included in the final model. As shown in the third model, the moderating effects of *high income* on *question handling* and *waiting time* are significant and are thus included in the final model. Finally, *city* has a moderating effect on all three employee characteristics and on *greeting* so the moderating effect of *city* on *employee knowledge*, *question handling* and *greeting* are included in the final model.

Table 3: results base model and separate moderating effects

Model	(1)	(2)	(3)	(4)
Moderating effects	-	Product type	High income	City
Solution	0.183***	0.183***	0.182***	0.182***
Employee knowledge	0.348***	0.347***	0.350***	0.337***
Friendliness	0.116***	0.130***	0.115***	0.129***
Question handling	0.572***	0.559***	0.567***	0.558***
Waiting time	0.224***	0.229***	0.220***	0.219***
Greeting	0.0668***	0.0668***	0.0671***	0.0608***
Broadband	-0.0238***	0.231**	-0.0242***	-0.0243***
Both	0.0572***	0.0346	0.0573***	0.0573***
Other	-0.192***	-0.607*	-0.192***	-0.191***
High income	0.217***	0.217***	-0.498***	0.190***
City	0.00946	0.00929	0.00579	-0.277***
KPN 2.0	0.0371***	0.0373***	0.0375***	0.0367***
Broadband X Knowledge		0.00313		
Both X Knowledge		0.0122		
Other X Knowledge		-0.0665		
Broadband X Friendliness		-0.0837***		
Both X Friendliness		-0.00429		
Other X Friendliness		0.00612		
Broadband X Question handling		0.0546**		
Both X Question handling		0.0140		
Other X Question handling		0.0973		
Broadband X Waiting time		-0.0291***		
Both X Waiting time		-0.0187**		
Other X Waiting time		0.0587**		
High income X Knowledge			-0.0355	
High income X Friendliness			0.0290	
High income X Question handling			0.0773**	
High income X Waiting time			0.0675***	
High income X Greeting			0.0186	
City X Knowledge				0.0335**
City X Friendliness				-0.0400*
City X Question handling				0.0459**
City X Waiting time				0.00819
City X Greeting				0.0227***
Month dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Store dummies	YES	YES	YES	YES
Number of observations	314,472	314,472	314,472	314,472

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * P<0.1

19

5.2 Results final model

The results of the final model are presented in Table 4 (model 5). The coefficient of *solution* is positive and significant at the 1% level. This suggests that the service outcome has a positive effect on customer satisfaction and therefore, hypothesis 1 is accepted. The three employee characteristics (*knowledge*, *friendliness* and *question handling*) all have a positive significant effect on customer satisfaction, supporting hypothesis 2. Lastly, both *waiting time* and *greeting* have a positive and significant effect on customer satisfaction, which supports hypotheses 3 and 4. The effect of *KPN 2.0* on customer satisfaction is very small but significant. Therefore, this paper accepts hypothesis 5 that a better physical environment has a positive effect on customer satisfaction but a remark is made that other factors are way more important in determining customer satisfaction than the physical environment.

Interestingly, *employee knowledge*, *question handling* and *waiting time* have a stronger effect on customer satisfaction than *solution*. This suggests that customers value the interaction with employees and the perceived waiting time more than the outcome of the service encounter itself.

5.3 Moderating effects

Product type

The coefficient of *broadband X friendliness* is negative and significant, suggesting that customers who visit a KPN store for a broadband product value friendliness of an employee less than customers who come to the store for a mobile phone. On the other hand, *broadband X question handling* is positive and significant which implies that *question handling* has a stronger effect on the satisfaction of broadband-customers than it has on the satisfaction of mobile-customers. Hypothesis 6 is partially accepted: while the product type does moderate the effects of *friendliness* and *question handling* on customer satisfaction, it has no significant moderating effect on the effect of *employee knowledge*.

The coefficients of *broadband X waiting time* and *both X waiting time* are negative and significant at the 1% and 5% level respectively. This implies that a longer waiting time has a less negative effect on customers who visit a KPN store for a broadband product or both a mobile and a broadband product compared to customers who visit a store for a mobile product only. Intuitively, this makes sense because ordering a broadband product or both products takes more time than ordering a mobile product. Therefore, it is likely that customers who visit a KPN store for a broadband product or both a mobile and broadband product already take a longer handling time into account and thus are more forgiving when it comes to a longer waiting time. Contrarily, *other X waiting time* is positive and significant at the 5% level, which suggests that a better waiting time has a stronger effect on the satisfaction of customers who come by for *other* products than broadband and/or mobile products compared to customers who come to a store for a mobile product. Because *other* products are usually products that should take little time (for instance buying a phone cover or headphones) it makes sense that a longer waiting time has a stronger effect on the customer satisfaction. Based on the results described above, hypothesis 7 is accepted.

High income
The coefficient of *high-income X question handling* is positive and significant at the 1% level. This entails that a better question handling has a stronger positive effect on customer satisfaction in stores that are located in areas with a high income compared to stores that are not located in high-income areas. Hypothesis 8 is partly accepted: the income level does influence the effect of *question handling* on customer satisfaction but the effects of *employee knowledge* and *friendliness* are not affected by the income level of the area in which the store is located.
High income X waiting time has a positive significant effect on customer satisfaction. This implies that a better perceived waiting time has a stronger positive effect on customer satisfaction in stores located in high-income areas compared to stores located outside high-income areas. Hypothesis 9 is partly accepted: while the positive effect of a better perceived waiting time is stronger in stores located in high-income regions, the effect of greeting does not significantly differ between stores located in high-income areas and stores located outside high-income areas.

City
Whether a store is located in a city or not has a clear moderating effect on the effects of two components of employee characteristics on customer satisfaction. First, a positive and significant effect of *city X knowledge* is observed. This implies that a better *employee knowledge* has a stronger positive effect on customer satisfaction in stores located in an urban region compared to stores that are not located in an urban region. The moderating effect of *city* on the last employee characteristic, *question handling*, is significant and positive. This suggests that a better question handling has a stronger positive effect on customer satisfaction in stores located in a city compared to stores located outside a city. Based on the conclusions described above, hypothesis 10 is partly accepted: *city* has a moderating effect on the effect of *employee knowledge* and *question handling* while the moderating effect of *city* on *friendliness* is insignificant.
The positive and significant coefficient of *city X greeting* implies that customers of a store in an urban region value a better *greeting* more than customers of a store located outside an urban area. The urbanity of the region has no significant moderating effect on *waiting time*, which suggests that there is no difference in the valuation of *waiting time* between customers in a store located in a city and customers in a store located outside a city. Therefore, hypothesis 11 is partially accepted.

5.4 Robustness check
As discussed in the Methodology (page 16), there is an ongoing debate whether ordered categorical variables can be treated as continuous variables. To test the robustness of the results, this paper assesses the effects of the same variables on customer satisfaction using an ordered probit model, which treats the dependent variable as a categorical variable. The results of the robustness check are presented in Table 4 (model 6).
When examining the results of the ordered probit model, only the sign and significance of the coefficients can be interpreted (Franses & Paap, 2001) (Osborne, 2015). As shown in Table 4, the coefficients of the six key drivers don't change in sign and significance when using the ordered probit model and neither does the coefficient of *KPN 2.0* (physical environment).
When checking the moderating effect of *product type*, the coefficient of *both X question handling* has a significant positive effect in the ordered probit model while the coefficient in

the main model is insignificant. Contrarily, the coefficients of *both X waiting time* and *other X waiting time* are less significant, with *other X waiting time* losing significance at all. The sign of the moderating effects of product type does not change for all the variables discussed above. The moderating effects of *high income* on *question handling* and *waiting time* does not differ between the multiple linear regression (final model) and the ordered probit model (robustness check). The significance of *city X friendliness* and *city X question handling* change a little but the effect of both variables remains significant. Because the sign of none of the coefficients changes between the main model and the robustness check and because the significance of only a few variables change a little, this paper concludes that the results of the base model are robust for the characteristic of the dependent variable.

Table 4: results final model and robustness check

Model	(5) Multiple linear regression		(6) Ordered probit	
Solution	0.183***	(0.00987)	0.155***	(0.00581)
Employee knowledge	0.337***	(0.00924)	0.264***	(0. 00560)
Friendliness	0.143***	(0.0137)	0.107***	(0.00806)
Question handling	0.539***	(0.0112)	0.329***	(0.00620)
Waiting time	0.224***	(0.00344)	0.216***	(0.00256)
Greeting	0.0611***	(0.00448)	0.0673***	(0.00317)
Broadband	0.222**	(0.0982)	0.147**	(0.0613)
Both	0.0411	(0.125)	-0.108	(0.0798)
Other	-0.622	(0.335)	-0.115	(0.203)
High income	-0.463***	(0.113)	-0.318***	(0.0686)
City	-0.287***	(0.0779)	-0.157***	(0.0493)
KPN 2.0	0.0369***	(0.00982)	0.0317***	(0.00842)
Broadband X Friendliness	-0.0835***	(0.0269)	-0.0400**	(0.0161)
Both X Friendliness	-0.000457	(0.0333)	0.0135	(0.0207)
Other X Friendliness	-0.0158	(0.0940)	-0.0193	(0.0530)
Broadband X Question handling	0.0583***	(0.0185)	0.0268***	(0.00962)
Both X Question handling	0.0203	(0.0244)	**0.0313****	**(0.0131)**
Other X Question handling	0.0585	(0.0613)	-0.0129	(0.0303)
Broadband X Waiting time	-0.0279***	(0.00822)	-0.0243***	(0.00589)
Both X Waiting time	-0.0181**	(0.00841)	**-0.0109**	**(0.00634)**
Other X Waiting time	0.0575**	(0.0290)	**0.0279**	**(0.0186)**
High income X Question handling	0.0769***	(0.0217)	0.0489***	(0.0116)
High income X Waiting time	0.0728***	(0.0117)	0.0609***	(0.00816)
City X Knowledge	0.0337**	(0.0166)	0.0256**	(0.0101)
City X Friendliness	-0.0395	(0.0212)	**-0.0275****	**(0.0126)**
City X Question handling	0.0474***	(0.0183)	**0.0188**	**(0.0100)**
City X Greeting	0.0225***	(0.00762)	0.0205***	(0.00529)

Month dummies	YES		YES
Year dummies	YES		YES
Store dummies	YES		YES
Observations	314,472		314,472

Robust standard errors in parentheses
*** p<0.01, ** p<0.05

6. Discussion

This section discusses the most important outcomes of the model. Although it is not the scope of this research, this paper also suggests some implications for the strategy that companies operating in the telecom sector can pursue in order to effectively increase customer satisfaction.

One of the most important outcomes of this study concerns the importance of employee characteristics on customer satisfaction. As expected, all three employee characteristics have a positive and significant effect on customer satisfaction. This outcome isn't surprising but what is very interesting is the fact that both *employee knowledge* and *question handling* have a stronger effect on satisfaction than the outcome of the service encounter. This implies that if companies want to improve customer satisfaction they have to focus more on the quality of the service delivery instead of the service outcome. In order to increase employee friendliness and knowledge, firms have to offer relevant training and provide employees with clear information about the different products that the company offers. To increase the question handling, employees have to be able to offer the customers the service they think is appropriate without being restrained by too many rules imposed by the company. Obviously, there are more possibilities to increase employee friendliness and knowledge but this is out of scope of this paper.

Another interesting outcome of this research is the fact that customers value various aspects of the service encounter differently for different products. In the specific case of the telecom industry, customers who visit the store for more difficult products value question handling more and waiting time less than customers who visit the store for a mobile phone. With this knowledge in mind, a possible action to improve customer satisfaction might be to implement a separate waiting line for customers who visit the store with a more difficult question.

The fact that customers of stores in high-income areas value waiting time more than customers in stores outside high-income areas is another interesting outcome of this study. With this knowledge in mind, companies could consider investing more in bringing down the waiting time in these areas, hereby increasing the customer satisfaction of customers that are likely to spent relatively much. Some suggestions to bring down waiting time include assigning more FTEs to stores located in high-income regions and implementing a more efficient and faster system. But, like the question on how to increase employee friendliness and knowledge, the different ways to decrease waiting time is out of scope of this research.

Another interesting outcome of this study is the difference in the valuation of different factors that influence customer satisfaction between customers in stores located in a city and customers in stores located outside a city. Customers in a city value knowledge, question handling and greeting more compared to customers outside a city. At the same time, they value friendliness less than customers outside a city. With these outcomes in mind, companies can offer different trainings to employees in a city and employees outside a city. The training of employees in a city should focus more on the knowledge and question handling while the training of employees outside a city should focus more on the social skills of the employee.

As described in the data part of this research, KPN invests in a new store formula in order to increase customer satisfaction. Based on the results of the model, it would be more efficient

to invest in improving employee characteristics and bringing down the waiting time than in improving the physical quality of the stores.

7. Limitations

Although this paper provides interesting insights based on a huge database, a few limitations remain. First of all, due to privacy legislation, it is not possible to distinguish between different customers in order to take personal characteristics into account. It is likely that for instance the age of a customer influences the effect on customer satisfaction of the several factors assessed in this study. Also, it is probable that customers assess the NPS value differently. A Net Promotor Score of 9 might for one customer indicate that he or she is very satisfied while a score of 9 indicates a regular experience for another customer. It is not possible to take these differences into account because it is not known which surveys are answered by which customers.

Another limitation of this study is the possibility of common method variance, where the observed variance is because of the measurement method rather than the factors that the measure is assumed to present (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To partially control for this bias, the survey asks respondents not directly to state how satisfied they are with KPN but asks how likely it is that they will recommend the company to a friend or colleague. Furthermore, the scale on which the dependent variable is measured ($0 - 10$) differs from the scale of the independent variables ($1 - 5$).
Following Podsakoff et al., this study suggests a possible solution to control even further for this potential bias. In order to reduce the respondent's ability to use previous answers to fill in gaps in what is recalled and/or to infer missing details, this paper recommends to retrieve the dependent variable and the independent variables on different times (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Due to database limitations, it is not possible to apply this solution in this study.

The last limitation of this study is the possible endogeneity of the results. It is likely that the model omits some relevant variables, like the personal characteristics discussed earlier. Furthermore, it is possible that customers that are more satisfied with the service of KPN rate the key drivers higher, resulting in reverse causality. Possible endogeneity can be tested using instrumental variables but this dataset has no variable that only influences the independent variables without having an effect on the dependent variable.

8. Conclusion

Customer satisfaction is crucial to establish a long-term relationship with customers which, in time, boosts the performance of companies. While the strong effects of satisfaction on performance have been confirmed by many studies, research into which factors determine customer satisfaction is limited and has some considerable limitations. This research is the first study that takes many different determinants and possible moderators of customer satisfaction into account. The goal of this paper is twofold: first it aims to give clear insights in the effects of important elements of customer satisfaction in the telecom sector, their effect on satisfaction and possible moderators of the effects of these determinants. Second, this

paper proposes a customer satisfaction model which can be used in further research into this topic.

In order to assess the determinants of customer satisfaction, this study uses customer satisfaction surveys collected by KPN, a telecom provider in the Netherlands, as main database. In these surveys, customers rate several aspects of the service encounter as well as their satisfaction with the company.

The two most interesting findings of this study concern the strength of the effect of employee characteristics on customer satisfaction and moderating factors of the determinants of customer satisfaction. The employee characteristics have a stronger effect on customer satisfaction than the outcome of the service itself. Based on this finding, this paper advises companies that are trying to improve their customer satisfaction to focus on improving employee characteristics rather than improving the service outcome. Regarding the moderating factors, this study finds that the product type, income level and urbanity of the region moderate the effect that the determinants have on customer satisfaction. Therefore, this study suggests that companies should not define one strategy for the whole chain but define different elements to focus on for different regions.

As described above, this analysis focuses on one company in the telecommunications sector. While the results are expected to give a reliable insight in the determinants of customer satisfaction in the whole sector, further research is needed to test whether the results also hold for other service sectors. Furthermore, this paper suggests to improve several factors, for instance question handling and employee friendliness. While this study lists some suggestions on how to do this, more specific research is needed in order to test whether this has the desired effect and whether there are other possibilities to achieve an improvement of the different factors.

This study is the first research into specific determinants of customer satisfaction that uses a huge database and takes possible moderating effects into account. This paper contributes to existing literature in this topic by providing and partly testing a customer satisfaction model. While the specific factors influencing customer satisfaction might differ per sector, the fundamental relationships presented in the model are expected to be the same for the whole telecom sector. Therefore, the proposed model can be used as a basis for further research into the determinants of customer satisfaction in this sector.

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Appendix

Appendix A

Effect of Customer Service Representatives on customer satisfaction (Froehle, 2006)
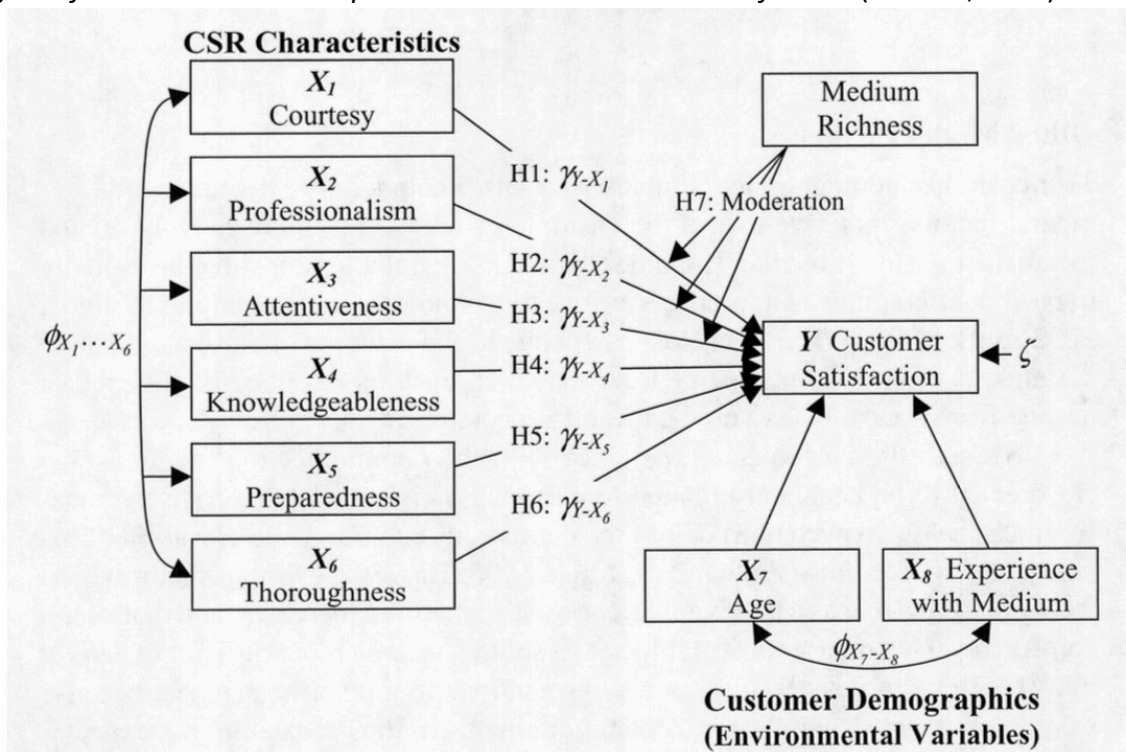
Appendix B

Table 5 – Questions customer satisfaction survey KPN

		Scale
Solution	*How do you rate the solution?*	1 to 5
Interaction quality	*How do you rate the friendliness of the employee?*	1 to 5
	How do you rate the knowledge of the employee?	1 to 5
	How do you rate the question handling of the employee?	1 to 5
Accessibility	*How do you rate the greeting?*	1 to 5
	How do you rate the waiting time?	1 to 5
NPS	*How likely are you to recommend our company to a friend or colleague*	

Appendix C

Table 6 – Variance Inflation Factor (VIF) values

	VIF	1/VIF
Solution	3.60	0.28
Employee knowledge	3.05	0.33
Employee friendliness	2.88	0.35
Question handling	3.25	0.31
Waiting time	1.49	0.67
Greeting	1.70	0.59