

ASSESSMENT OF THE QUALITY OF MOBILE  
TELECOMMUNICATIONS SERVICES

Catarina Cecílio Martins

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Supervisor:

Prof. Eurico Brilhante Dias, Assistant Professor, ISCTE Business School, Marketing,  
Operations and General Management Department

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## **ABSTRACT**

Over the past decades, the telecommunications sector has grown both in terms of revenues, both in terms of number of clients, which in turn has meant that the demand for the quality of services provided by mobile network operators increased.

Given the above, this thesis aims to assess how clients perceive the perceived quality of the mobile network operator service through a quality measurement tool adapted to the respective sector (SERVPERF).

With regard to methodology, an online questionnaire was applied based on SERVPERF instrument developed by Cronin Jr. and Taylor (1992), adding some items due to the peculiarity of mobile telecommunications services. In order to process the data obtained, the Statistical Package for Social Sciences ("SPSS") version 22 was used exclusively, which allowed for various statistical calculations.

With regard to the results, there is a general positive perception of the quality of mobile telecommunications services, highlighting the Communication dimension, but only with a very little significant difference regarding the Tariff dimension. In addition, and after having performed the Principal Component Analysis ("PCA") the initial eight dimensions became only three, namely: Service Provider, Accessibility and Communication and Tangibility.

Lastly, some recommendations were proposed to improve the perceived quality of service being studied, regarding a proximity policy, the implementation of the service, the disclosure / provision of information and the facilities.

**Keywords:** Service Quality; Mobile Telecommunications; Customer Satisfaction; SERVPERF

**JEL Classification:** L96; Y40

## RESUMO

Ao longo das últimas décadas, o setor das telecomunicações tem crescido quer a nível de receitas, quer a nível do número de clientes, que por sua vez fez com que a exigência para com a qualidade dos serviços prestados pelos operadores de rede móvel aumentasse.

Face ao exposto, a presente dissertação tem como objetivo principal avaliar como os clientes percecionam a qualidade percebida do serviço dos operadores de rede móvel através de uma ferramenta de medição de qualidade adaptada ao respetivo setor (SERVPERF).

Relativamente à metodologia, foi aplicado um questionário via *online* baseado no instrumento SERVPERF desenvolvido por Cronin Jr. e Taylor (1992), acrescentando alguns itens devido à peculiaridade dos serviços de telecomunicações móveis. De forma a tratar os dados obtidos, recorreu-se exclusivamente ao programa *Statistical Package for Social Sciences* (“SPSS”) versão 22, o qual permitiu a realização de diversos cálculos estatísticos.

No que diz respeito aos resultados, verifica-se de uma forma geral que a perceção da qualidade dos serviços de telecomunicações móveis é positiva, destacando-se a dimensão *Communication*, contudo apenas com uma diferença pouco significativa face à dimensão *Tariff*.

Por último, foram propostas algumas recomendações de melhoria da qualidade percebida do serviço em estudo, relativamente a uma política de proximidade, à execução do serviço, à divulgação/disponibilização de informações e às instalações.

**Palavras-chave:** Qualidade no Serviço; Telecomunicações Móveis; Satisfação do Cliente; SERVPERF

**Classificação JEL:** L96; Y40

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## LIST OF ABBREVIATIONS

<b>ANACOM</b>	Autoridade Nacional de Comunicações
<b>APN WAP</b>	Access Protocol Access Point Name
<b>BLF</b>	Fixed/Landline Broadband
<b>BLM</b>	Mobile Broadband
<b>CAGR</b>	Compound Annual Growth Rate
<b>E</b>	Client's expectations
<b>INE</b>	Statistics Portugal
<b>KMO</b>	Kaiser-Meyer-Olkin
<b>M2M</b>	Machine-to-Machine
<b>MEO</b>	MEO – Serviços de Comunicações e Multimédia, S.A.
<b>MMS</b>	Multimedia Messaging Service
<b>MOT</b>	Moment of Truth
<b>NOS</b>	NOS Comunicações, S.A.
<b>P</b>	Perceived Performance
<b>PCA</b>	Principal Component Analysis
<b>PORDATA</b>	PORDATA – Contemporary Portugal Database
<b>SAI</b>	Internet Access Service
<b>SMS</b>	Short Message Service
<b>SPSS</b>	Statistical Package for Social Scienses
<b>STF</b>	Fixed/Landline Telephone Service
<b>STM</b>	Mobile Telephone Service
<b>STVS</b>	Pay-TV Service
<b>Vodafone</b>	Vodafone Portugal – Comunicações Pessoais, S.A.

# 1. INTRODUCTION

The introductory chapter of this thesis has as main purpose the presentation of the study subject, i.e the assessment of the quality of mobile telecommunications services, exposing their goals and the respective questions to be asked and studied later, as well as the description of the report structure.

## 1.1. Theme framework

Since 1990, the importance of the telecommunications sector has been increasing, as the industry has become a dynamic force capable of performing functions in technological, economic and productive development of developed economies (Jurisic & Azevedo, 2011).

The telecommunications sector is divided between the fixed telecommunications sector and the mobile telecommunications sector (MarketLine, 2016), where the latter has grown abundantly in the last two decades, due to technological development occurred (Jurisic & Azevedo, 2011). Reason for which, the dissertation will address this sector.

The rapid growth of the mobile telecommunications sector provided the appearance of several operators and now a day, in Portugal, a market that is in a mature stage, we have six operators who offer a wide range of products and services.

In such a competitive market such as mobile telecommunications, where operators are constantly trying to attract new clients and new markets, but also to maintain the current ones, it's crucial that the service provided is of the utmost quality and perceived as such by them. Quoting William A. Foster: *“Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives”*.

Several studies have shown that there is a direct relationship between the quality of service rendered and client satisfaction and loyalty (Kothari, Sharma, & Rathore, 2011). Through some studies it was found that the quality rendered is not only beneficial for the clients but it also helps companies to gain market share, to recover their investment (Anderson & Zeithaml, 1984), to reduce costs and improve productivity (Garvin, 1983).

The quality of the mobile telecommunications service is one aspect with great influence on the client when choosing a mobile operator. Clients, who have a good experience with a particular operator, will probably, choose and remain with that same operator, while the same is not true for those who have a bad experience, as so often happens with many people we are close to and to ourselves. For this reason, improving the mobile telecommunications service is important to maintain current clients and to be able to attract new users.

In the case of tangible goods, quality measurement is an easy task, because the uniform quality standards can be consistently found, but when we approach the quality of services, measurement thereof becomes complicated (Kothari, Sharma, & Rathore, 2011).

It is therefore essential the development of quality measuring instruments for mobile telecommunications services, which are increasingly accurate and reflect the actual client satisfaction.

### **1.2. Research objectives**

The dissertation will have as main objective the evaluation of the quality of service of mobile telecommunications perceived by the clients through a quality measurement tool adapted to the respective sector – SERVPERF.

There are several specific objectives that will help achieve the main goal, as aforementioned:

- ▶ Quantify the perceived quality by mobile telecommunication service users for each item present in this study to be carried out;
- ▶ Analyze the distribution of answers pertaining to each item;
- ▶ Assess the ability of items to measure the quality of the dimension in which they are included;
- ▶ Identify the dimensions of service quality where clients of operators of mobile telecommunications are more and less satisfied;
- ▶ Verify the presence of significant differences in perceived quality in each dimension regarding characterizing factors of the sample and of the use of the service;
- ▶ Regroup the analyzed items in new dimensions, by means of a correlation criterion; and,
- ▶ Suggest recommendations that allow the improvement of the quality of mobile telecommunications services.

### 1.3. Research problem

The purpose behind this dissertation is to evaluate the client satisfaction level of mobile telecommunications services, that is, to understand what clients value most in this kind of services and how satisfied are they with the services provided to them.

This problem arises in the sense that the current consumer is becoming better informed, the risk of changing mobile telecommunications operators is greater and the products and services available in the market are becoming increasingly similar, making the quality of service, the main differentiating factor.

The main issues at stake and that will be the focus of research and investigation are the following:

- ▶ What is the perception of the clients of mobile telecommunications services regarding the quality of the service rendered?
- ▶ The items corresponding to each dimension have internal consistency?
- ▶ Are there differences in perceived quality in each of the dimensions analyzed regarding client characteristics and the use of mobile telecommunications?
- ▶ In the event of items being grouped through a correlation criterion, what are the differences regarding the original model?

After a careful approach to the aforementioned questions, will it then be possible to obtain the desired answers, and finally know about the satisfaction degree of the clients of telecommunications services.

### 1.4. Thesis structure

Regarding the structure, the present research work is organized in 5 different chapters in addition to the introduction, namely: (ii) literature review; (iii) theoretical contextualization; (iii) research methodology; (iv) analysis of the results; (v) final conclusions.

The second chapter, *literature review*, presents the essential theoretical information to support the theoretical basis of the research. So we approach the concept of service quality, the instruments that measure the quality of the service (SERVQUAL and SERVPERF). Lastly, some studies will be presented that address different attributes of service quality, specifically for mobile telecommunications services.

## Assessment of the Quality of Mobile Telecommunications Services

Next, comes the chapter of *telecommunications services* over which a small framework of the global industry will be made, as well as, and more specifically, an analysis of the mobile services nationwide.

The next chapter focuses on the *research methodology*, i.e the conceptual models that will be used as analytical tools are addressed, as well as the respective dimensions and independent variables. Moreover, a presentation of the collecting methodology and processing the data is made.

The *analysis of the results* can be read in the fourth chapter, which will present the results obtained through the questionnaire. This chapter will answer the research questions that were initially placed from the sample characterization, analysis of the distribution of concordance, the characterization of the profile averages relative to the overall sample and independent variables.

In the last chapter the *final conclusions* of this dissertation will be presented. Furthermore, and in addition to being presented the main limitations of the study, strategies will also be suggested towards improving the quality of mobile telecommunications services in Portugal.

## 2. LITERATURE REVIEW

The literature review is a research process of literature, journal articles, newspaper articles, government reports, among others, of analysis and description of the issue to address, which in this case is the evaluation of client satisfaction regarding the services of mobile telecommunications.

Thus, in this chapter we will address the concept of service quality, the two instruments for evaluation (SERVQUAL and SERVPERF), as well as the attributes of service quality.

### 2.1. Concept of Service Quality

With increasing competition and customer demand in the 80's, the service sector has been forced to develop new ways of doing business against competitors, this trend eventually intensified after this sector became the most influential in all the world economies. As a result, scholars have focused on the issue of quality, this one originated in factories, where the concept was directly linked to the production of final goods without defects. Later, the concept was expanded to include all internal resources (Duggal & Verma, 2013).

Thus, there is a wide divergence on the definition of quality by various scholars, triggering a huge debate on the subject (Brady & Cronin Jr., 2001), as evidenced by the table below, which shows some of the various existing perspectives.

**Table 1** – Service quality perspectives

Source	Quality defined as	Perspective
Berry <i>et al.</i> (1980)	The customer's impression of the service provided	Customer's idea
Lehtinen and Lehtinen (1982)	Service quality is the result of the comparison that customers make between their expectations about a service and their perception of the way the service has been performed.	Perceptions-Expectations
Lewis and Booms (1983)	Service quality involves comparing customer expectations to the performances obtained from the service provided.	Perceptions-Expectations
Gronroos (1984)	Service quality is a perceived judgment, resulting from an evaluation process where customers compare their expectations with the service they perceive to have received.	Perceptions-Expectations
Buzzell and Gale (1987)	Quality is whatever the customer say it is, and the quality of a particular product or service is whatever the customer perceives it to be.	Customer's judgment
Parasuraman <i>et al.</i> (1988)	Perceived service quality is a global judgment, or attitude, relating to the superiority of the service.	Customer's judgment



## Assessment of the Quality of Mobile Telecommunications Services

Source	Quality defined as	Perspective
<b>Teas (1993)</b>	Service quality is comparison of performance with ideal standards.	Epitome reference
<b>Cronin and Taylor (1994)</b>	Service quality is a form of attitude representing a long-run overall evaluation.	Overall service quality
<b>Rust and Oliver (1994)</b>	Service quality is a comparison to excellence in service encounters by the customer.	Epitome reference
<b>Bitner and Hubbert (1994)</b>	The consumer's overall impression of the relative inferiority/superiority of the organization and its services.	Overall service quality
<b>Clow et al. (1997)</b>	Service quality is viewed as the result of the comparison that customers make between their expectations about a service and their perception of the way the service is received.	Perceptions-Expectations
<b>Roest and Pieters (1997)</b>	Service quality is a relativistic and cognitive discrepancy between experience-based norms and performances concerning service benefits.	Discrepancy based construct

Source: (Duggal & Verma, 2013)

Moreover, there are major differences between the services and consumer goods (Fitzgerald, Johnston, Brignall, & Voss, 1993) due to the particular characteristics of services - intangibility, heterogeneity, inseparability and perishability – which represent a major challenge for providers (Polyakova & Mirza, 2015). Thus, we consider the quality of services as an abstract and illusory concept, resulting, therefore, in so many difficulties in their assessment (Cronin Jr. & Taylor, 1992).

The performance of services can not be counted, measured, tested or verified, i.e, most services are intangible (Bateson, 1977; Berry, 1980; Lovelock, 1981; Shostack, 1977), ending up in hampering service providers in the analysis of how customers perceive and evaluate the quality (Zeithaml, 1981).

Regarding the heterogeneity of services, you can say that they vary their performance from producer to producer, from customer to customer and from day to day. Thus, it is not possible to ensure that the service performance of providers is consistent for all customers (Booms & Bitner, 1981), to the extent that the service that one tries to provide may not match the service received by customers.

In services it's impossible to have a separation between production and consumption (Carmen e Langeard, 1980; Gronroos, 1978; Regan, 1963; Upah, 1980). As a result, the quality of service is not performed in factories and subsequently delivered to the customer, according to what is done with consumer goods. In the service sector the quality is measurable during the provision thereof, i.e during the two-way interaction between the customer and the service provider

(Lehtinen & Lehtinen, 1982). In services there is less management control over quality, however customers have greater participation, because they affect the process. In these situations, the result of the customers is central to the quality of service.

Finally, the fourth feature of the service is the perishability, which is the inability of a service to be stored for later use, resold or returned, entailing greater responsibility to service providers, as they will always have to provide a quality service on the first try, there is no possibility of repeating the same (Ghobadian, Speller, & Jones, 1994).

Thus, according to Parasuraman *et al.* (1985) three issues are referred as being underlying to the various studies on the quality of services: (i) assessing the quality of services is a more complex task than assessing the quality of goods; (ii) comparing customer's expectations with the performance of services rendered; (iii) the quality assessment is made not only on the outcome of a service, it also involves evaluations of the process of service provision.

Several scholars agree with the idea that the quality of services consists of comparing customer expectations ("E") and perceived performance ("P"). Lewis and Booms (1983) state that *"service quality is a measure of how well the service level delivered matches customer expectations. Delivering quality service means conforming to customer expectations on a consistent basis"*.

Therefore, service quality can be measured according to the following formula:

$$SQ_i = \sum_{j=1}^k (P_{ij} - E_{ij})$$

It is noted that in the above formula:

- ▶  $SQ_i$ , corresponds to the perceived quality of the service by person i;
- ▶ k, corresponds to the number of service attributes; and,
- ▶  $P_{ij}$  and  $E_{ij}$ , correspond to the perception and expectations, respectively, of the person i regarding the service performance of business j.

From the formula presented above we can get three different results:

- ▶  $E > P$ : when customer expectations have not achieved the desired result;
- ▶  $E < P$ : when customer expectations were exceeded;
- ▶  $E = P$ : when customer expectations are met.

The evaluation of quality of services can be measured through various instruments, among which stand out the SERVQUAL and SERVPERF instruments, which will be discussed below.

## **2.2. SERVQUAL Instrument**

Several scholars, such as Gronroos (1983, 1990, 2001) and Parasuraman *et al.* (1985, 1988), have been dedicated to the research quality of services in order to realize their dimensions and their background.

This way, Parasuraman *et al.*(1988) defines the quality of services as a difference between customer expectations and the perception that they had of the effective performance of the service rendered, being that customer expectations match what the customers think that the services providers will offer, while customer perception reflects what customers felt regarding what they received from the service providers.

Thus, the SERVQUAL instrument appears in an investigation whose aim was to create an instrument to assess the quality of services.

This instrument is considered to be multidimensional and initially consisted of a set of 97 items divided into ten dimensions, called determinants of service quality: Access; Communication; Skills; Courtesy; Credibility, Reliability, Responsiveness, Security; Tangibility; and Understanding / Customer Knowledge (Parasuraman, Zeithaml, & Berry, 1985).

The items related to the aforementioned ten dimensions were separated into two phases, i.e., the first grouped the items that assessed customer expectations regarding the provision of services and the second grouped the items that assessed customer perception about the provision of the services.

In order to perform this evaluation, Parasuraman *et al.* (1988) suggested using the Likert scale (seven points), which ranges from "Strongly Disagree" (1) and "Totally Agree" (7), and in which the points 2 to 6 do not hold any description.

Later, due to various statistical changes in the SERVQUAL instrument, the 97 items became 22, while the ten dimensions mentioned above were regrouped into the following five final dimensions.

**Table 2 – SERVQUAL dimensions**

Dimensions	Definition	Items in scale
<b>Reliability</b>	The ability to perform the promised service dependably and accurately	4
<b>Assurance</b>	The knowledge and courtesy of employees and their ability to convey trust and confidence	5
<b>Tangibles</b>	The appearance of physical facilities, equipment, personnel and communication materials	4
<b>Empathy</b>	The provision of caring, individualized attention to customers	5
<b>Responsiveness</b>	The willingness to help customers and to provide prompt service	4

Source: (Buttle, 1995)

With this reformulation of the SERVQUAL instrument, only two new dimensions appeared, Reliability and Empathy, which grouped the items representing the seven original dimensions – Communication; Credibility; Security; Competence; Courtesy; Understanding / Knowing, Customers; and Access.

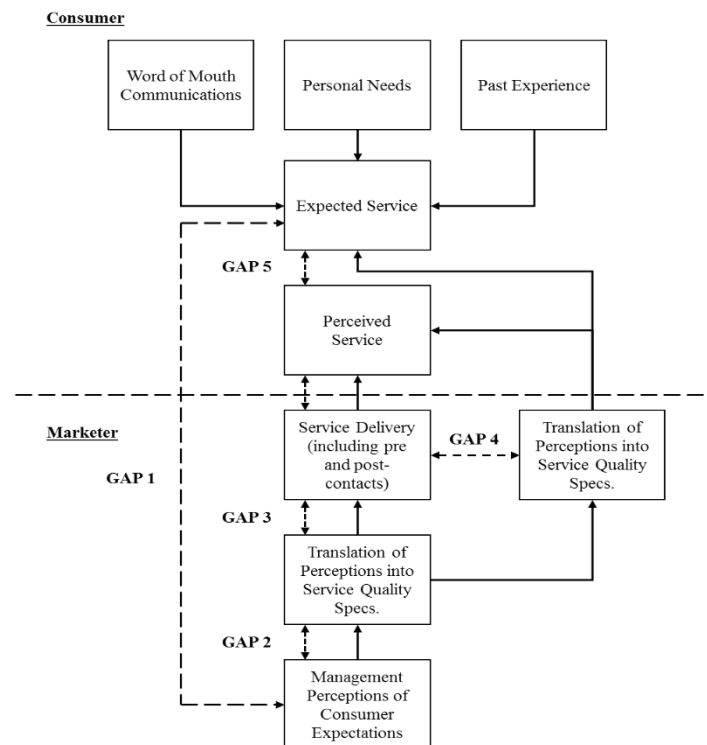
From the analysis conducted by Parasuraman *et al.* (1985) an important result was obtained: *“A set of key discrepancies or gaps exists regarding executive perceptions of service quality and the tasks associated with service delivery to consumers. These gaps can be major hurdles in attempting to deliver a service which consumers would perceive as being of high quality”*.

Thus, the *gaps* found were the following:

- ▶ **Consumer expectation – management perception gap (GAP 1):** Sometimes the management team of a company may not understand what are the features that are considered to be of high quality to consumers, i.e. what a service should have as characteristics in order to satisfy consumer needs.
- ▶ **Management perception – service quality specification gap (GAP 2):** Management perception - service quality specification gap (GAP 2): There are a variety of factors, such as constraints on resources, market conditions and/or undifferentiated management, which could trigger a difference between the perception of management on the expectations of consumers and the specifications of quality of service defined by the company.

- ▶ **Service quality specifications – service delivery gap (GAP 3):** Even with guidelines as to how to perform a service, the performance with high quality thereof may not be achieved, in the extent that its capacity will depend substantially on the workers' performance, which can not always be standardized.
- ▶ **Service delivery –external communications gap (GAP 4):** The communication made by a company about its services, such as advertising, can affect not only customer expectations regarding the service provided by the company, but also the perception of customer regarding the service. Because, if the company creates too high expectations in consumers, the service will have to meet them, otherwise customers will not be satisfied.
- ▶ **Expected service – perceived service gap (GAP 5):** The high and low quality judgments made by consumers are dependent on how they perceive the service that was actually rendered in accordance with their expectations.

Figure 1 – Service quality model



Source: (Parasuraman, Zeithaml, & Berry, 1985)

According to Parasuraman *et al.* (1985), the perception of service quality by consumers depends both on the size and the direction of GAP 5, which in turn depends on the nature of the gaps

associated with the design, marketing and services. Thus, GAP 5 results of the remaining gaps, ending up with these influencing GAP 5 positively and negatively the quality of service perceived by consumers.

Moreover, through figure 1 it is possible to see that consumer expectations given the quality of a service are based on experiences lived by themselves or by others (through word of mouth), but also personal needs at the time of the service provision.

However, several criticisms have been aimed at the SERVQUAL instrument, as seen for example in the article “SERVQUAL: review, critique, research agenda” of Buttle (1995), which are divided between conceptual criticism (1) and operating criticism (2) , as can be seen in the table below.

**Table 3 – SERVQUAL criticisms**

<b>1. Theoretical criticisms</b>	
<b>Paradigmatic objections</b>	SERVQUAL is based on a disconfirmation paradigm rather than an attitudinal paradigm; and SERVQUAL fails to draw on established economic, statistical and psychological theory
<b>Gaps model</b>	There is little evidence that customers assess service quality in terms of Perceptions – Expectations gaps
<b>Process orientation</b>	SERVQUAL focuses on the process of service delivery, not the outcomes of the service encounter
<b>Dimensionality</b>	SERVQUAL’s five dimensions are not universals; the number of dimensions comprising service quality is contextualized; items do not always load on to the factors which one would a priori expect; and there is a high degree of intercorrelation between the five RATER dimensions
<b>2. Operational criticisms</b>	
<b>Expectations</b>	The term expectation is polysemic; consumers use standards other than expectations to evaluate service quality; and SERVQUAL fails to measure absolute service quality expectations
<b>Item composition</b>	Four or five items can not capture the variability within each SQ dimension
<b>Moment of Truth (“MOT”)</b>	Customers’ assessments of service quality may vary from MOT to MOT
<b>Polarity</b>	The reversed polarity of items in the scale causes respondent error
<b>Scale points</b>	The seven-point Likert scale is flawed
<b>Two administrations</b>	Two administrations of the instrument causes boredom and confusion
<b>Variance extracted</b>	The over SERVQUAL score accounts for a disappointing proportion of item variances

Source:(Buttle, 1995)

### 2.3. SERVPERF Instrument

The analysis of the quality of service provision can be measured also by the SERVPERF instrument and this was developed by Cronin Jr. and Taylor (1992).

Note that this tool is in every way identical to the SERVQUAL instrument, but it bases its analysis of the quality of services only in the perception of the performance of services by consumers after they have had used them.

Thus, the SERVPERF instrument consists of 22 items, which represent the five dimensions of quality (Reliability; Assurance; Tangibility; Empathy; and Responsiveness) used in the SERVQUAL instrument of Parasuraman *et al.*(1988), which took into account only the performance perceived by consumers. In addition, the scale used was also the Likert scale (7 points).

Throughout the document “Measuring Service Quality: A Reexamination and Extension” of Cronin Jr. and Taylor (1992) four instruments were compared – SERVQUAL (1), weighted SERVQUAL (2), SERVPERF (3) and weighted SERVPERF (4) – which measure the quality of services, whose equations are the following:

- (1) Service quality = (Performance – Expectations)
- (2) Service quality = Importance \* (Performance – Expectations)
- (3) Service quality = (Performance)
- (4) Service quality = Importance \* (Performance)

These instruments were applied to evaluate the quality of services in four industries (banks, fast food, pest control and dry cleaning). While the SERVQUAL instrument was only suited to two of the assessed industries (banks and fast food), the SERVPERF instrument fitted the four industries evaluated, demonstrating the superiority of this instrument against the SERVQUAL instrument (Cronin Jr. & Taylor, 1992).

In the previously mentioned study the following issues were discussed:

- ▶ “How should service quality be conceptualized and measured?”
- ▶ “What is the causal order of the relationship between service quality and consumer satisfaction?”

- ▶ “What impacts do service quality and consumer satisfaction have on purchase intentions?”

In response to the first question, the study concluded that “*service quality should be conceptualized and measured as an attitude*”. Moreover the approach based only on performance is preferred, i.e. the use of the SERVPERF tool is preferred to the instrument SERVQUAL, because better differentiates the variation of quality of services.

Regarding the relationship between service quality, customer satisfaction and purchase intent, the study authors say that the perceived quality of the services precedes the satisfaction of consumers which, in turn, will affect the purchase intentions, ending up having more influence on the decisions than the very quality of services.

## 2.4. Attributes of service quality

The quality perception and customer satisfaction are key factors for the competitiveness of services. Thus, it is important to identify the elements that determine the perceived quality and satisfaction from the customers' point of view using any type of service. The existence of a relationship between the determinants of customer satisfaction and the identification of the key attributes that affect the perceived quality of the customers of the various services will be crucial.

However, there is a huge lack of studies that simultaneously relate the set of determinants, due to the large volume of aspects to take into account, because the existing studies, often, address small groups of determinants.

Thus, several studies on the quality of services were made and eventually a comprehensive set of attributes was identified, due to the different authors but also because of the nature of the service, as can be seen in the table below.

**Table 4** – Service quality attributes

Researchers	Attributes
Sasser (1978)	Security, consistency, attitude, completeness, condition, availability and training
Lehtinen and Lehtinen (1982)	Physical quality (products and/or services), corporate quality (company image), interactive quality (interaction between the consumer and the service organization)



## Assessment of the Quality of Mobile Telecommunications Services

Researchers	Attributes
<b>Gronroos (1984)</b>	Technical quality of the outcome, functional quality of the encounter, company corporate image
<b>Garvin (1987)</b>	Performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality
<b>Cadotte and Turgeon (1988)</b>	Complaints and compliments
<b>Garssing and Hessick (1988)</b>	Accuracy, timeliness, simplicity, consistency, employee attitudes, Cost
<b>Leblanc and Nguyen (1988)</b>	Physical environment & instruments, internal organisation, service encounter, customer satisfaction and corporate image
<b>Hedvall and Paltschik (1989)</b>	Willingness and ability to serve, physical and psychological Access
<b>Johnston and Silvestro (1990)</b>	Hygiene factors, enhancing factors and dual-threshold factors
<b>Carman (1990) - Hospitals</b>	Admission service, tangible accommodations, tangible food, tangible privacy, nursing care, explanation of treatment, access and courtesy afforded to visitors, discharge planning and patient accounting
<b>Brucks and Zeithaml (1991) - Automobiles</b>	Reliability, serviceability, prestige, durability, functionality and ease of use
<b>Saleh and Ryan (1992) – Hotel Industry</b>	Conviviality, tangibles, reassurance, avoidance of sarcasm, and Empathy
<b>Babakus and Boller (1992)</b>	Service quality
<b>Bouman and van der Weile (1992) – Car-service Industry</b>	Customer kindness, tangibles and faith
<b>Gagliano and Hathcote (1994) – Retail Industry</b>	Personal attention, reliability, tangibles and convenience
<b>McDougall and Levesque (1994)</b>	Service outcome, service process and physical environment
<b>Avkiran (1994) – Teller Services</b>	Staff conduct, credibility, communication and access
<b>Dabholkar et al. (1996) – Retail Industry</b>	Physical aspects, reliability, personal interaction, problem solving and policy
<b>Beinstoc et al. (1997)</b>	Physical distribution (timeliness, availability, and condition)
<b>Bahia and Nantel (2000) – Retail Banking</b>	Effectiveness and assurance, service portfolio, reliability, tangibles, access and price
<b>Brady et al. (2001)</b>	Interaction quality, outcome quality and physical environment Quality
<b>Cronin (2003)</b>	Variability, regret, resistance, equity and disgust

Source: (Duggal & Verma, 2013)

Despite the many studies conducted, none of them could be sufficiently comprehensive in order to be able to evaluate all existing services.

## Assessment of the Quality of Mobile Telecommunications Services

One of the most used instruments for evaluating the quality of a service is SERVQUAL developed by Parasuraman *et al.* (1988), having as dimensions Reliability, Assurance, Tangibility, Empathy and Responsiveness. However, and as mentioned above, this instrument has also been found insufficient to evaluate the quality of services, including the mobile telecommunications.

Thus, we conclude that there is no agreement on the number of dimensions regarding the quality of services.

Also noteworthy is that there were already some studies made that have focused on telecommunications services, as seen below.

In the study conducted by Muhammad Arslan, Maria Iftikhae and Rashid Zaman (2014), through which one sought to establish a relationship between the dimensions of Service quality and Customer satisfaction in Pakistan's telecommunications sector, customer Satisfaction was defined as the dependent variable, while Trust and Empathy were defined as independent variables responsible for increasing Customer satisfaction. The above-identified variables were chosen because they were considered to be the most important with respect to telecommunication services, to the extent that they cover most of the characteristics of the service.

The independent variable Trust refers to accessibility, continuity and performance of services, having been evaluated using the following criteria:

- ▶ *“The signals are clear”;*
- ▶ *“The voice quality is clear and there is no distortion”;*
- ▶ *“The service quality is up to my expectations”;*
- ▶ *“The service quality can be made better”;*
- ▶ *“The call packages are appropriately priced”;*
- ▶ *“The sms packages are appropriately priced”;*
- ▶ *“Internet service is appropriately priced”;*
- ▶ *“Other facilities like caller tunes/sms bundles are appropriately priced”;*
- ▶ *“Performs services right the first time”;*

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- ▶ *“Provides services at the promised time”*;
- ▶ *“Keeps customers informed about when services will be performed”*; and,
- ▶ *“Keeps its packages and services up to date”*.

The independent variable Empathy refers to the attitude of employees towards customers and was evaluated through the following criteria:

- ▶ *“My call is answered as soon as I call”*;
- ▶ *“The managers / employees always have my best at heart”*;
- ▶ *“Employees show care and concern while talking to me”*;
- ▶ *“The managers / employees give individual attention to my problems and interests”*;
- ▶ *“Service personnel always carefully listen to my complains and requests”*;
- ▶ *“Complain process is convenient to use”*;
- ▶ *“My feedback and suggestions are implemented when possible”*;
- ▶ *“My queries are resolved within time”*; and,
- ▶ *“I get an immediate solution for my complains”*.

Finally, the Customer Satisfaction dependent variable was assessed using the following criteria:

- ▶ *“The sms packages satisfaction”*;
- ▶ *“The call packages satisfaction”*;
- ▶ *“The quality of voice call satisfaction”*;
- ▶ *“Signals satisfaction”*;
- ▶ *“The speed of messaging satisfaction”*;
- ▶ *“The attitude of the employees satisfaction”*;
- ▶ *“The pricing satisfactions”*;
- ▶ *“The Internet bundles satisfaction”*;
- ▶ *“SMS / call international bundles satisfaction”*; and,
- ▶ *“Customer support centre satisfaction”*.

## Assessment of the Quality of Mobile Telecommunications Services

Through this study, it was possible to prove the existence of a relationship between Customer satisfaction and the two variables of Service quality, Trust and Empathy.

In another research performed by Rajkumar Paulrajan and Harish Rajkumar (2011), in order to examine and understand the choice made by consumers with regard to providers of mobile telecommunications services, the following items were considered as dimensions and respective attributes of quality of service:

- ▶ *“Communication (call quality, call drop rate and geographical coverage)”*;
- ▶ *“Call service (call forwarding and, waiting and service quality)”*;
- ▶ *“Facility (short message service, mobile entertainment and new technology use)”*;
- ▶ *“Price (calling rate, promotional offers and product range)”*;
- ▶ *“Customer care (complaint redressal system and complaint resolution)”*; and,
- ▶ *“Service provider (customers’ relations, innovativeness, restoration capabilities, reliability and responsiveness)”*.

From the conducted research, it was possible to conclude that the perception of consumers is quite varied depending on the quality of the various dimensions mentioned above (Communication; Call service; Facility; Price; Customer care; and Service provider). Furthermore, the study shows that Communication and Price are the most influential and preferred dimensions with regard to the selection of telecommunications service providers. However, Quality and Product availability have a significant impact on the choice of telecommunications service providers.

The article “Determinants of Customer Satisfaction in Telecom Industry”, written by Shahzad Khan and Saima Afsheen (2012), showed that customer satisfaction depends on the following factors:

- ▶ *“Customer service”*;
- ▶ *“Sales promotion”*;
- ▶ *“Signal strength”*;
- ▶ *“Promotion”*;
- ▶ *“Coverage”*; and,

- ▶ *“Price fairness”*.

This article concluded that the factors that most influence customer satisfaction are Fair price and Network coverage.

In the article “Customer Satisfaction in the Mobile Telecom Industry in Bahrain: Antecedents and Consequences”, written by Mohammed M. Almosawi (2012), the attributes that exert greater influence on customer satisfaction were analyzed, in the switching and permanence with a service provider, subsequently identified.

**Determinants of customer satisfaction** (ranked in terms of their importance in determining customer satisfaction):

- ▶ *“Attractive offers”*;
- ▶ *“Signal quality”*;
- ▶ *“Calls & SMS charges”*;
- ▶ *“Voice quality”*;
- ▶ *“Monthly calls rent”*;
- ▶ *“Using advanced technology”*;
- ▶ *“Monthly data rent”*;
- ▶ *“Quality of call center services”*;
- ▶ *“Quality of service at retail /service shops”*;
- ▶ *“Having retail / service shops in many places”*;
- ▶ *“Mobile provider being modern”*;
- ▶ *“Mobile provider being friendly”*;
- ▶ *“Mobile provider keeping in touch”*; and,
- ▶ *“Having user-friendly website”*.

**Determinants of customer switching** (ranked in terms of their importance in determining customer switching):

- ▶ *“Had a better offer”*;

## Assessment of the Quality of Mobile Telecommunications Services

- ▶ *“Dissatisfied with the charges applied by previous provider”*;
- ▶ *“The new provider has a strong signal coverage”*;
- ▶ *“The new provider has a good reputation in the telecom industry”*;
- ▶ *“The new provider was recommended by friends / relatives who I trust”*;
- ▶ *“I was influenced by the advertisements of the new provider”*;
- ▶ *“The possibility of switching without losing my telephone number”*;
- ▶ *“The previous provider was very slow in responding to my enquiries/problems”*;
- ▶ *“I was dissatisfied with the customer service of the previous provide”*; and,
- ▶ *“Curious to try a new provider”*.

**Determinants of customer retention** (ranked in terms of their importance in determining customer retention):

- ▶ *“I am satisfied with the provider’s offers / promotions”*;
- ▶ *“I am satisfied with the provider’s charges”*;
- ▶ *“I am satisfied with the provider’s signal coverage”*;
- ▶ *“I am satisfied with the provider’s monthly rent”*;
- ▶ *“I do not have a better option”*;
- ▶ *“I am satisfied with the provider’s customer care”*;
- ▶ *“I feel happy and good in dealing with the provider”*; and,
- ▶ *“I am satisfied with the provider’s website”*.

The factors related with payment and savings of services rendered, such as offers, rentals and charges, are considered as the most significant for satisfaction, permanence and ability to switch from one mobile operator to another competitor. Conversely, the communication factors, such as customer service, friendly employees and user-friendly sites, are less significant than the factors mentioned above.

### **3. TELECOMMUNICATION SERVICES**

In order to get better acquainted with the reality under study, a brief framework of the global telecommunications sector will be presented, and the mobile services in Portugal will also be addressed. Finally, the critical success factors and potential risks of the telecommunications services sector will be highlighted.

#### **3.1. Framework**

The market for telecommunications services consists of the fixed/landline telecommunications networks and wireless telecommunications networks.

The value of the segment of fixed/landline communication networks is measured by the revenues obtained by the voice telephone operators and other data transmission equipment via fixed lines (wirelines). The market value of this segment is calculated based on revenues from end-users for utilizations and subscriptions, excluding revenues related to transactions between operators in the wholesale market. Included are also the revenues from Internet and value-added services.

On the other hand, the segment of the wireless systems is defined by mobile phones, pagers and all other wireless telecommunication services. The revenues are derived from payments to operators of all these services, utilizations and subscriptions.

The market volume is calculated by the total of existing fixed/landline phones and mobile subscribers.

#### **3.2. Global telecommunication services**

According to the study performed by Marketline<sup>1</sup>, “Global Telecommunication Services” published in February 2016, the global telecommunications market between 2011 and 2015, contracted slightly. However, it is expected this scenario to be reversed during the period

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<sup>1</sup>Marketline is a database specialized in *business information* and provides qualitative and quantitative data for many different industries, countries and companies.

## Assessment of the Quality of Mobile Telecommunications Services

between 2016 and 2020, witnessing a moderate growth whose main responsible will be the Asia-Pacific market<sup>2</sup>.

The global market for telecommunications services predicted to generate in the year 2015, a total revenue of 977,1 billion euros, which represents a 2,6% decrease when compared to 2014. In the period between 2011 and 2015, the market recorded a Compound Annual GrowthRate (“CAGR”) of -1,4%, as it can be seen in the table below.

**Table 5** – Revenues generated by the global telecommunication services

Year	Revenues (€ billion)	Growth (%)
2011	1.034,1	-
2012	1.026,3	-0,8
2013	1.012,5	-1,3
2014	1.003,1	-0,9
2015 (e)	977,1	-2,6
<b>CAGR (2011-2015)</b>		<b>-1,4</b>

(e) - estimate

Source:(MarketLine, 2016)

It is expected that by 2015, the market size in relation to consumption, registers a growth of 3.6% compared to 2014, reaching approximately 7,4 billion subscribers. In the period between 2011 and 2015, the market recorded a CAGR of 3,9%, representing an increase in the value of the global market consumption of telecommunications services compared to consumption levels registered in 2011. In addition, it is expected that by the end of 2020, the market volume will increase to 8.645,9 million subscribers, representing a CAGR of 3,1% for the period between 2015 and 2020.

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<sup>2</sup> For the purposes of the “Global Telecommunication Services” study, the Asia-Pacific region comprises the following countries: Australia, China, Hong Kong, India, Indonesia, Kazakhstan, Japan, Malaysia, New Zealand, Pakistan, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam.



**Table 6** – Volume of the global telecommunication services

Year	Billion subscribers	Growth (%)
2011	6,3	-
2012	6,6	4,5
2013	6,9	4,3
2014	7,1	3,3
2015 (e)	7,4	3,6
<b>CAGR (2011-2015)</b>		<b>3,9</b>

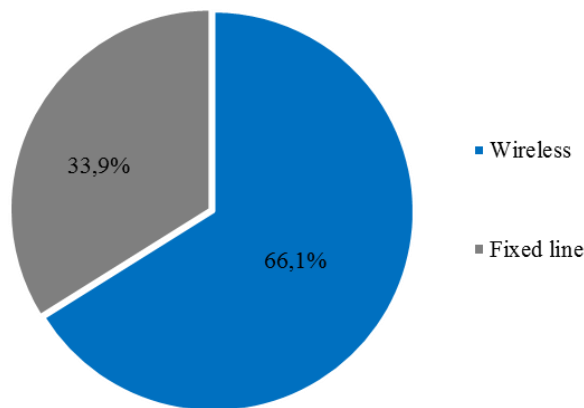
(e) - estimate

Source:(MarketLine, 2016)

### 3.2.1. Market segmentation by category

In 2015 the largest segment of the market of telecommunications services, with a share of 66,1%, was the wireless systems, also acquiring the title of being the most profitable, with total revenues of 858.8 billion de dollars. In contrast, the segment of fixed communications networks, with a share of 33,9% market share, obtained in 2015 a total revenue of 439.8 billion dollars.

**Graph 1** – Global telecommunication services market category segmentation: % share, by value, 2015 (e)

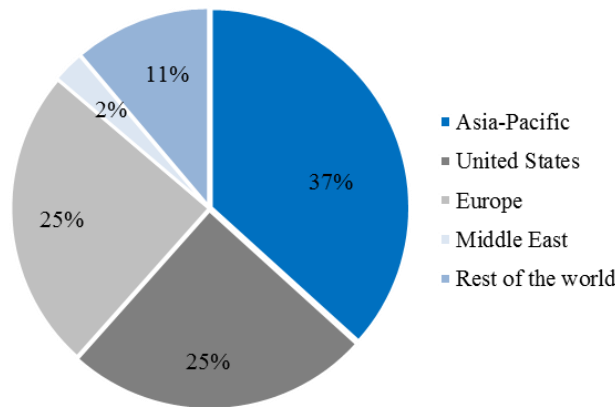


Source: (MarketLine, 2016)

### 3.2.2. Market segmentation by geographic area<sup>3</sup>

The Asia-Pacific market in terms of value, is the market with the greatest relative weight in the world, accounting for 37% of international market share. Then the US market and the European market both represent a share of 25% of the market value in analysis, as it can be seen in Graph 2.

**Graph 2** – Global telecommunication services market geography segmentation: % share, by value, 2015 (e)



Source: (MarketLine, 2016)

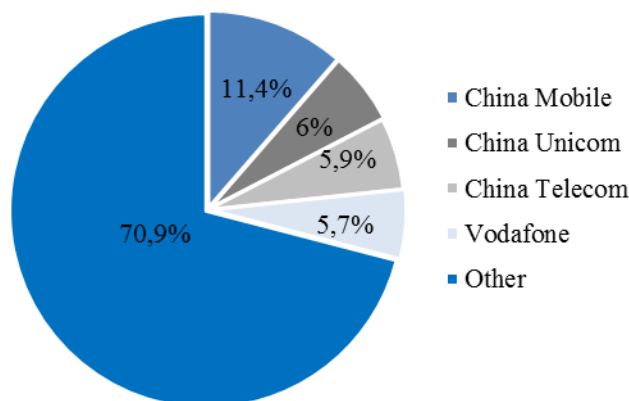
### 3.2.3. Major telecommunications service companies

In the global market of telecommunications services those that stand out as major competitors are China Mobile (11,4%), China Unicom (6%) and China Telecom (5,9%). Following, it's Vodafone with a representation of 5,7%, among all other existing companies (70,9%), as can be seen in Graph 3.

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<sup>3</sup>For the purposes of the “Global Telecommunication Services” study, the Europe region comprises the following countries: Austria, Belgium, The Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom. The Middle East region comprises the following countries: Egypt, Israel, Saudi Arabia, and United Arab Emirates.

**Graph 3** – Global telecommunication services market share: % share, by value, 2015 (e)



Source: (MarketLine, 2016)

### 3.3. Mobile services<sup>4</sup> in Portugal

#### 3.3.1. Mobile service penetration rate

According to the report done by the Autoridade Nacional de Comunicações (“ANACOM”) “Mobile Services in 2015”, published in February 2016, the penetration rate of mobile services at the end of 2015, amounted to 161,8 per 100 inhabitants. In the event of only being considered mobile stations with actual use<sup>5</sup>, the national penetration rate would be 123,2 per 100 inhabitants. Nevertheless, in the event of being excluded the exclusive cards to access the Internet and mobile stations connected to the service *Machine-to-Machine* (“M2M”), the penetration rate was 112,9 per 100 inhabitants.

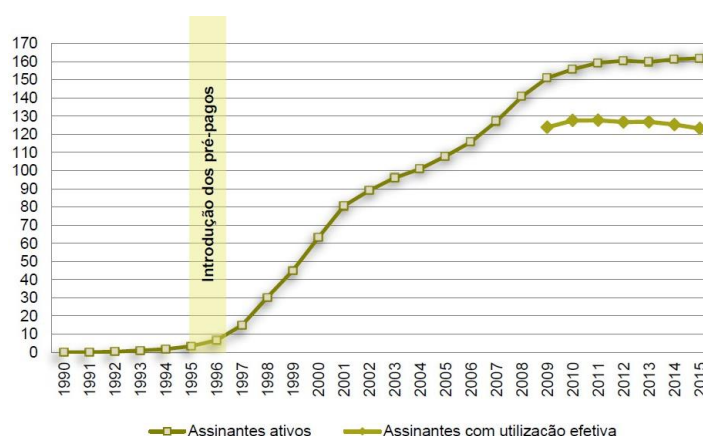
In the graph below it is possible to check the existing penetration of the Mobile Telephone Service (“STM”) in Portugal.

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<sup>4</sup> Mobile services are the Mobile Telephone Service (“STM”) and Mobile Broadband (“BLM”), including the Internet Access Service (“SAI”).

<sup>5</sup> Active mobile stations with actual use are those that are authorized to use the services that were actually used in the reporting period, *i.e.*, recorded traffic in the last month.

**Graph 4 – STM penetration in Portugal**



Unit: subscribers per 100 inhabitants

Source: (MarketLine, 2016)

Moreover, as noted in the study conducted by Markttest “Telecommunications Barometer - Mobile Networks of Markttest”, in December 2015, 95% of the resident population in Portugal was a client of STM.

### 3.3.2. Level of use of mobile services

#### 3.3.2.1. Mobile stations / Active user equipments

At the end of 2015 there were 16,8 million of STM subscribers, corresponding this amount to an increase of 0,3% of total subscribers over the same year. However, only 12,8 million subscribers actually used the service in December 2015, equivalent to 76% of the total, less than 1,7% at the end of 2014.

**Table 7**– Number of mobile stations / active user equipment (subscribers) with effective utilization

	2014	2015	Var. 2014/2015	Annual Average Var. 2011/2015	Accumulated Var. 2011/2015
<b>Number of mobile stations / active user equipment connected to active post-paid plans, prepaid plans and combined / hybrid plans</b>	16.732	16.790	0,3%	0,0%	0,0%
<b>of those which with actual use</b>	13.004	12.779	-1,7%	-1,3%	-5,1%
<b>those connected to M2M</b>	496	493	-0,6%	n.a.	n.a.

## Assessment of the Quality of Mobile Telecommunications Services

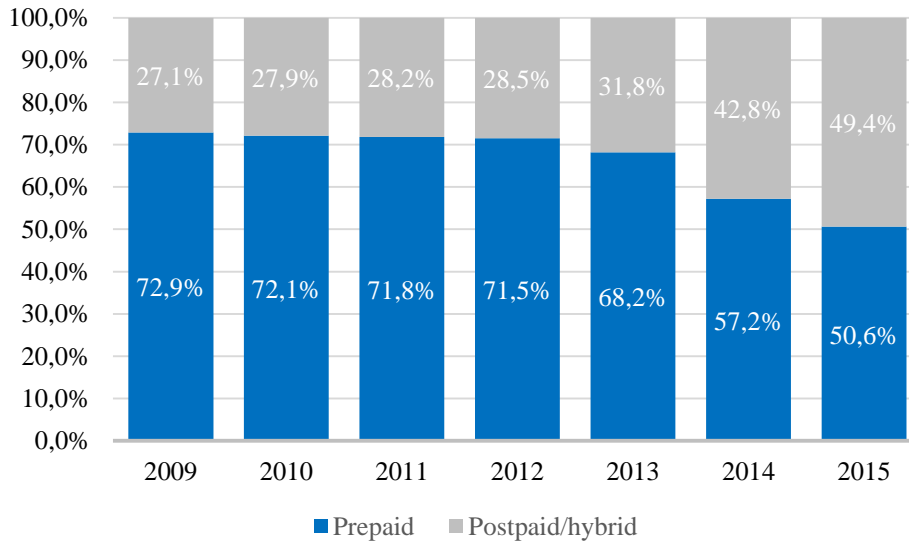
	2014	2015	Var. 2014/2015	Annual Average Var. 2011/2015	Accumulated Var. 2011/2015
<b>those which with are prepaid</b>	7.459	6.341	-15,0%	-10,8%	-36,7%
<b>those which with are postpaid/hybrid</b>	5.545	6.438	16,1%	16,9%	86,6%

Units: thousands of subscribers, %

Source: (ANACOM, 2016)

More adds that, at the end of 2015, about 50,6% of subscribers used pre-paid plans, representing a decrease of 6,6% than that of the end of last year, a trend that has been observed since the beginning of 2013.

**Graph 5–** Distribution of subscribers by type of tariff plan



Source: (ANACOM, 2016)

This evolution reflects (i) the development of new offers 3G and 4G, which most often are in a post-paid system, (ii) the introduction of tariffs with traffic included in the monthly fee and last but not least, (iii) increased penetration of multiple play tariff (these incorporate various services, such as the Fixed Telephone Service (“STF”), STM, Fixed Broadband (“BLF”), BLM and subscription television service (“STVS”)) incorporating the STM and whose tariffs are post-paid / hybrids.

## Assessment of the Quality of Mobile Telecommunications Services

### 3.3.2.2. Typical service users of mobile broadband

At the end of 2015 there were around 13,2 million users able to use the BLM services, accounting for 4,9% when compared to the previous year.

In recent years there has been an increase in the number of active users of BLM services due mainly to the growth of Internet access service users by BLM.

**Table 8**– Number of broadband service users

	2014	2015	Var. 2014/2015	Annual Average Var. 2011/2015	Accumulated Var. 2011/2015
<b>Total number of users of broadband services</b>	12.580	13.197	4,9%	4,3%	18,1%
<b>of which 3G service users, upgrades and equivalent standards in the reporting period</b>	5.498	5.841	6,3%	8,9%	40,6%
<b>of which users of the Internet access service for broadband</b>	5.102	5.522	8,2%	17,2%	88,8%
<b>of which users with specific tariff for Internet access on BLM</b>	2.088	1.735	-16,9%	-	-
<b>of which connected to the Internet via tablet/PC</b>	673	572	-15,1%	-15,7%	-49,6%
<b>of which Internet on the phone<sup>6</sup></b>	4.428	4.950	11,8%	28,9%	>100%

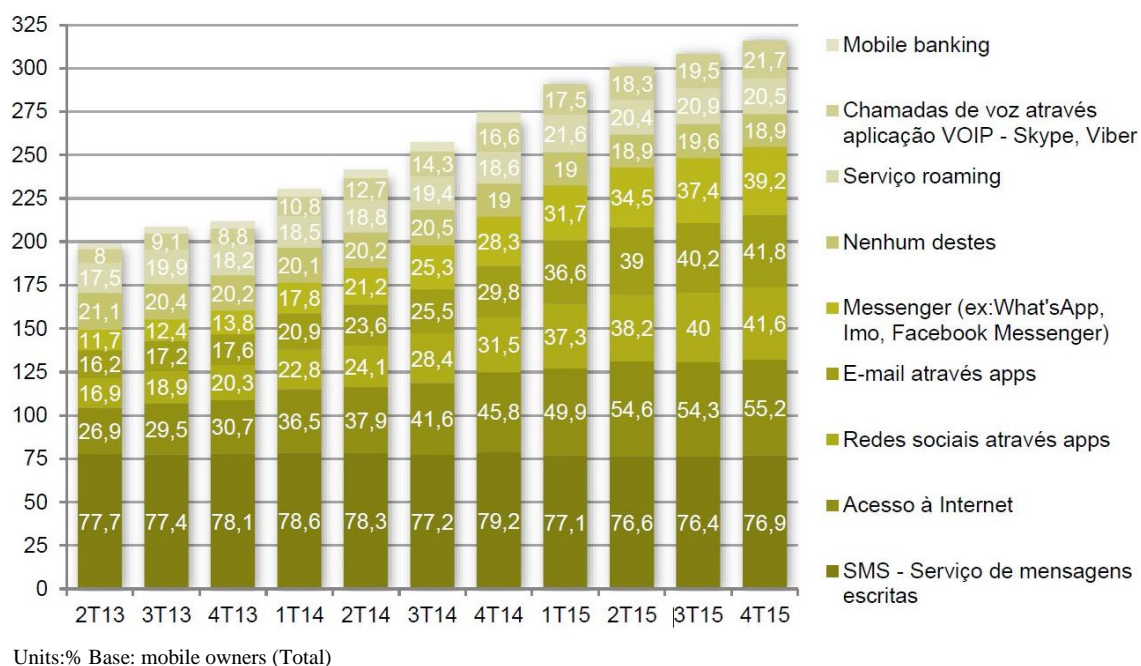
Units: thousands of subscribers, %

Source: (ANACOM, 2016)

In addition to the internet access (browsing), there are other activities related to BLM, such as the use of social media, the use of electronic mail, use of instant messaging and the making of calls (VoIP – Voice over Internet Protocol).

<sup>6</sup> The estimated number of SAI users through the mobile phone is the result of the difference between the total of SAI users in BLM and users with connections through tablet/PC.

**Graph 6**– Level of use of other services on the mobile phone



Source: (Marktest, 2015)

### 3.3.2.3. Voice traffic

In 2015 voice traffic in terms of minutes, increased by 5,3%, possibly due to the introduction of deals with so-called "zero cents" phonecalls to all mobile networks. In addition, the number of calls made by the STM subscribers also increased, mais 5,4% que em 2014, more than in 2014, recording a total of 9,7 billion.

### 3.3.2.4. Short Message Service (“SMS”)

Contrary to what occurred in respect to voice traffic in 2015, the number of text messages sent was reduced by about 11,2%, which is higher than the average decrease in recent years (-5,6%). This is justified mainly by the emergence of alternative forms of communication and the introduction of tariffs with included data traffic, driving users of SMS service to use the Internet access service.

**Table 9 – SMS originated on their own network**

	2014	2015	Var. 2014/2015	Annual Average Var. 2011/2015	Accumulated Var. 2011/2015
<b>Number of SMS originating</b>	<b>24.029</b>	<b>21.341</b>	<b>-11,2%</b>	<b>-5,6%</b>	<b>-20,7%</b>
SMS to own their network	21.679	16.810	-22,5%	-10,2%	-34,8%
SMS to other national STM	2.282	4.469	95,8%	45,0%	342,6%
SMS to national STF's	2	2	0,8%	-10,1%	-34,7%
SMS to international networks	65	60	-8,2%	-9,8%	-33,7%

Units: millions of messages

Source: (ANACOM, 2016)

### 3.3.2.5. Multimedia Messaging Service (“MMS”), video calls e mobile TV, WAP

The number of MMS users is relatively small, as compared with the volume of SMS's, the volume of MMS is substantially reduced. Although an increase from 2007 was recorded, since 2014 we have come to register annual declines, and in 2015 the MMS number decreased 23,5%. This reality can be justified, as seen in the SMS's due to alternative multimedia messaging solutions.

**Table 10– Data Services: MMS originated on their own network, video calls, mobile TV e WAP**

	Unit	2014	2015	Var. 2014/2015	Annual Average Var. 2011/2015	Accumulated Var. 2011/2015
<b>Number of multimedia messages</b>	Millions	140	107	-23,5%	-7,2%	-25,8%
<b>Number of video calls</b>	Thousands	2.048	2.661	30,0%	-2,3%	-9,0%
<b>Volume of traffic of video calls</b>	Thousands of minutes	7.972	9.192	15,3%	-8,1%	-28,6%
<b>Sessions Mobile TV</b>	Thousands	1.266	2.651	109,4%	20,2%	108,6%
<b>Traffic Mobile TV</b>	TB	24	33	39,4%	47,5%	>100%
<b>Sessões Wireless Access Protocol Access Point Name Sessions (“APN WAP”)</b>	Millions	249	227	-8,9%	1,0%	3,9%
<b>Volume of APN WAP sessions</b>	TB	139	91	-34,8%	11,3%	53,4%

Units: million MMS messages, thousands of video calls, thousands of mobile TV sessions, TB, millions of WAP APN sessions, %

Source: (ANACOM, 2016)

The video telephone service, despite having a relatively low level of traffic, compared to the year 2014, greatly increased the number of video calls in 2015, as well as their volume of traffic,



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as can be seen in the table above. This growth results from equipment increase with the service (smartphones) and the introduction of free video calls in the tariff offer.

Regarding the Mobile TV service, introduced in 2006, there are two national operators offering the same (MEO Go and Vodafone Mobile TV), with daily, weekly and monthly subscriptions. The volume of mobile TV service traffic increased in 2015, yet the average volume per session in 2015 reached 13 MB, in the 4th quarter of 2015 recorded a 6,5MB reduction from the previous quarter.

Finally, the volume of data services via the WAP protocol decreased in 2015 (34,8%) when compared to the previous year. Moreover, it was also noticed a reduction of the number of sessions in 8,9%.

### 3.3.2.6. . International Roaming: Voice, SMS and Internet

At the end of the year 2015 the international roaming service users reached 859 thousand uses, 11,8% less than the previous year, corresponding to 7,3% of total active mobile stations with actual use, except Internet access cards and equipment M2M.

**Table 11** – International roaming users


	2014	2015	Var. 2014/2015	Annual Average Var. 2011/2015	Accumulated Var. 2011/2015
<b>International roaming users</b>	974	859	-11,8%	-0,4%	-1,4%

Unit: thousands of users



Source: (ANACOM, 2016)

### 3.3.3. STM providers

According to ANACOM, a company whose mission is to regulate the sector of electronic communications and postal, the STM providers in activity in the national territory in the fourth quarter of 2015 were as follows.

Operators and providers of STM	Description of operators and STM providers
 <b>(Network Operator)</b>	<b>MEO – Serviços de Comunicações e Multimédia, S.A. (“MEO”)</b> This entity has replaced the first mobile telecommunications operator in the country, TMN – Telecomunicações Móveis Nacionais, S.A., which is owned by Portugal

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Operators and providers of STM	Description of operators and STM providers
	Telecom Group. With this change there was a revolution in the market, because, for the first time, a voice operator also started to offer television and Internet services through fiber optics.
 <b>vodafone</b> (Network Operator)	<b>Vodafone Portugal – Comunicações Pessoais, S.A. (“Vodafone”)</b> The Vodafone Group is the mobile telecommunications company with the largest international presence. In March 2012, it held 404 million customers in more than 30 countries, but the brand is in more than 40 countries through its partners.
 <b>NOS</b> (Network Operator)	<b>NOS Comunicações, S.A. (“NOS”)</b> The NOS group is born from the merger between ZON Multimédia and OPTIMUS Telecomunicações, held in 2013, constituting the largest Portuguese communications and entertainment group.
<b>Service providers</b>	<ul style="list-style-type: none"> <li>▶ CTT – Correios de Portugal, S.A. (Phone-ix) – supported on the MEO network;</li> <li>▶ Lycamobile Portugal, Lda. – supported on the Vodafone network; and,</li> <li>▶ Mundio Mobile (Portugal) Limited – supported in the NOS network.</li> </ul>

The table below shows the distribution, by provider of the total number of active mobile stations associated with effectively used postpaid tariff plans, prepaid and hybrids.

**Table 12** –Distribution by provider of the active mobile stations/user equipment active with effective use

P roviders	2.º Quarter 2015	1.º Quarter 2016	2.º Quarter 2016	Var. quarterly (p.p.)	Var. homologous (p.p.)
<b>MEO</b>	44,8%	44,5%	44,1%	-0,3	-0,7
<b>Vodafone</b>	33,9%	32,4%	32,0%	-0,4	-2,0
<b>NOS</b>	19,5%	21,7%	22,4%	0,6	2,8
<b>Other providers</b>	1,7%	1,4%	1,5%	0,1	-0,2

Unit: %, p.p.

Source: (ANACOM, 2016)

Through the table above you can see that the MEO remains as the main provider with 44,1% of active mobile stations with actual use, followed by Vodafone with 32%. Excluding other providers, it is lastly NOS with a share of 22,4%, having been, however, the provider that registered the highest increase in the number of effectively used stations when compared to the last quarter (0,6%), as well as against the same period (2,8%).

Moreover, in April 2016, Cabovisão – Televisão por Cabo, S.A. and ONITELECOM - Infocomunicações, S.A. effected internal tests to the STM making the service available only to their employees.

## 4. RESEARCH METHODOLOGY

In this chapter we intend to make an explanation of the research methodology of that will be used in this thesis, presenting the models that will be used as analysis tools, the assumptions implicit in the models, the dependent and independent variables to be used, as well as conducting an analysis on the methodology of collecting and processing the data.

### 4.1. Conceptual models

Through the literature review done on this thesis, it was possible to obtain the necessary information in order to support the development of two instruments that will allow the evaluation of the quality perception of mobile telecommunications services provided by the several network operators in the domestic market.

The two instruments that will be applied will be based on the measurement of the perceived quality through the five dimensions proposed by Parasuraman *et al.* (1988). However, 3 more dimensions will be added – Communication; Availability Information; and Tariff – which are composed of several items that have been suggested by several authors (Muhammad Arslan, Maria Iftikhae, Rashid Zaman, Rajkumar Paulrajan and Harish Rajkumar, among others mentioned in the previous chapter of literature review). Thus, through the introduction of these 3 new dimensions, it will be possible to assess more clearly the customer satisfaction with the mobile telecommunications service. Moreover, they have also introduced two items in the dimensions: Tangibility e Responsiveness. These will enable a more authentic evaluation of the service being studied, and will also allow a close estimate of the overall satisfaction of various customers.

With respect to the independent variables, as you can see in section 4.3. *Independent variables*, we selected a set of eleven variables, which are divided between those that characterize customers and those that characterize the use of the service provided by network operators. The selection of these variables, as referred in the previous section 1.2. *Research objectives*, will have the intention to confirm or not the existence of considerable differences in the perceived quality in each of the dimensions compared to each one of these variables.

Moreover, the main instrument that will be used to measure the perceived quality is SERVPERF.

## 4.2. Dimensions of service quality

The instruments that will be used in the present study will consist of 9 dimensions: Reliability, Assurance; Tangibility; Empathy; Responsiveness; Communication; Availability Information; and Tariff, and these shall be composed of thirty-three items. Then we'll present the meaning of each dimension, as well as the number of questions that each covers.

- ▶ **Reliability** – Ability to perform the promised service dependably and safely by employees of network operators to customers, such as security in the provision of information to customers. This dimension is represented in the questionnaire by 4 items.
- ▶ **Assurance** – Knowledge of employees of network operators in order to provide a service with brevity and accuracy. Furthermore, this dimension includes the determination by the network operators in solving the problems of customers, and preferably on the first try. This dimension is represented in the questionnaire by 5 items.
- ▶ **Tangibility** – Appearance of the staff, physical facilities, equipment and communication materials, clarity of instructions on the products/services, as well as the entertainment available to the client while he/she is waiting to be serviced. This dimension is represented in the questionnaire by 6 items.
- ▶ **Empathy** – Ability to provide an individualized attention and a personalized customer service. This dimension is represented in the questionnaire by 5 items.
- ▶ **Responsiveness** – Total availability of network operators' staff to serve customers, responding promptly to questions, as well as tailor services to customers' needs. This dimension is represented in the questionnaire by 6 items.
- ▶ **Communication** – Service quality check through the existence or not of a good network coverage and the quality of voice calls. Moreover, the availability of sufficient network operators stores at the service of the customer in order to facilitate communication. This dimension is represented in the questionnaire by 3 items.
- ▶ **Availability of Information** – Proper provision of information, i.e, accessible and in various formats, as well as advance notice of the situations of changes of tariff. This dimension is represented in the questionnaire by 2 items.
- ▶ **Tariff** – Adequate value for money services, as well as if the forms of payment are the most suitable. This dimension is represented in the questionnaire by 2 items.

The questionnaire was used to collect the data used in this dissertation (see **Annex 1**) has issues organized by the 9 dimensions, and these appear in the following order: Tangibility; Assurance; Responsiveness; Reliability; Empathy; Communication; Availability Information; Tariff. Thus, the first 6 questions are related to the Tangibility dimension and so on and so forth.

To complete the questionnaire, we asked respondents to classify, overall, from 1 to 7, the quality of services provided by their network operator, where 1 is very poor and 7 corresponds to excellent.

### 4.3. Independent variables

As mentioned above, the independent variables that were selected to be incorporated in the model are subdivided in those that will characterize the sample collected and those which will characterize the use of the service offered by different network operators. However, below you can also check the groups that make up each variable.

#### 4.3.1. Independent variables that characterize the sample

- ▶ **Gender** (“Female”; “Male”);
- ▶ **Age Groups** (“Between 10 and 15”; “Between 16 and 24”; “Between 25 and 34 years”; “Between 35 and 44”) - the options of this variable will meet the survey meeting held by the National Statistics Institute (“INE”) – “Survey on the Use of Information and Communication Technologies by Families: 2005 to 2008”<sup>7</sup>, which lets you know which age groups use more a mobile phone in Portugal;
- ▶ **Educational level** (“Primary school: 4.º year”; “Elementary school : 6.º year”; “Middle school: 9.º year”; “High school”; “Bachelor's degree”; “Master's degree”; “Other”);
- ▶ **Employment status** (“Student”; “Employed”; “Unemployed”; “Retired or other inactive”) - the options of this variable will meet the survey conducted by INE – “Survey on the Use of Information and Communication technology in Families - 2015”, which allows us to make the division of this variable;
- ▶ **Gross household income in 2015** (“Less than 10.000€ per year”; “Between 10.000€ and 27.500€ per year”; “Between 27.501€ and 50.000€ per year”; “Between 50.001€ and 100.000€ per year”; “More than 100.000€ per year”) – the options in this variable

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<sup>7</sup> Latest available data

will meet the information available on the PORDATA database – Contemporary Portugal Database (“PORDATA”), “Households per income groups: IRS Form 1”.

#### **4.3.2. Independent variables that characterize the use of mobile phones**

- ▶ **Phone ownership** (“Yes”; “No”);
- ▶ **Network operator** (“NOS”; “MEO”; “Vodafone”; “Other”) – only the major network operators have been identified, but there is the possibility of the respondent indicating another network operator in the event of theirs not being any of the major ones;
- ▶ **Contract time** (“Less than three months”; “Between 3 to 6 months”; “Between 6 to 9 months”; “Between 9 months and 1 year”; “From 1 to 2 years”; “Between 2 to 3 years”; “More than 3 years”; “Does not know”);
- ▶ **Tariff plan** (“Prepaid”; “Postpaid”; “Does not know”) – it was decided to join the different existing tariffs in only two categories;
- ▶ **Service with greater importance** (“Voice calls”; “SMS”; “MMS”; “Internet”; “Other. What?”);
- ▶ **Staying with the Network Operator Maintenance** (“Yes”; “No”).

#### **4.4. Data collection methodology**

As mentioned earlier, and to respond to the questions initially posed, a questionnaire was designed with an accessible language and which included, mostly closed questions, in order to facilitate the treatment of the data.

However, it was not necessary to make a pre-test to validate the questionnaire, because it was made according to the questionnaire used on the master's thesis “Avaliação da Percepção da Qualidade do Serviço Prestado pela Empresa CARRIS”, written by Ricardo Filipe de Oliveira Brito (2015).

After the preparation of the questionnaire (see **Annex 1 and 2**) it was introduced in Google Forms platform and made available through the social network Facebook, over a period of two days (26 and 27 of September).

According to Reis and Moreira (1993), the sample is a subset of the individuals in a population. Given the above, the information obtained for a sample can be generalized to the entire

population. However, the samples do not always reflect the structure of the population from which they were removed or are representative of that population and it may lead to biased results.

Thus, in order to calculate the sample size it was considered that the survey population was infinite due to its large size, for a precision of 5% and a 95% confidence interval. Still according to Reis and Moreira (1993) the size of the sample with the above mentioned characteristics are obtained by the following equation:

$$n = \frac{\frac{z\alpha^2}{2} \cdot 0,5^2}{D^2}$$

It is noted that in the above equation:

- ▶  $\frac{z\alpha}{2}$ , corresponds to the value of the normal distribution for a significance level equal to  $\lambda = 1 - \alpha$ , which is equal to 1.96; and,
- ▶  $D$ , corresponding to the level of precision that is equal to 0,05.

From the previously presented equation it is possible to conclude that the sample will have a size of 385 individuals of both sexes, with ages between 10 and 44 years, corresponding this age group to the one that uses more mobile phones.

Finally, and in order to process the data obtained through the questionnaire, calculations will be performed and different statistical techniques used, using only the Statistical Package for Social Sciences (“SPSS”) version 22 for Windows.

## **5. ANALYSIS OF THE RESULTS**

This chapter will present the results obtained from questionnaires that were applied via online, answering the questions of the investigation that were placed in the beginning and fulfilling the objectives set for this thesis. Thus, they will be addressed in this chapter the following points: sample characterization, analysis of the distribution of the accordance of items, reliability of the SERVPERF instrument, characterization of the averages profile of the dimensions when compared to the whole sample and to the independent variables and analysis of principal components.

### **5.1. Sample characterization**

Initially the sample would only be composed of 385 individuals but due to the fact that the questionnaire was divulged to 1000 direct contacts of the investigator through the social network Facebook and then shared by many people, the sample increased to a total of 407 individuals.

Besides the number of respondents increased, the use of the social network to apply the questionnaire was quite beneficial, in the sense that it was possible to obtain the answers to the questionnaire swiftly. As such, it's enough to mention that the survey was only available for two on the month of September (from 26 to 27), and on the first day alone about 70% of total responses were submitted, corresponding to 284 questionnaires.

It is further noted that the sole criterion for eligibility of the respondents was age, that is, they would have to be aged between 10 and 44 years, as this age group corresponds to the most frequent users of mobile phones. Furthermore, and in the event of the sample comprising all ages, it could be skewed, since the questionnaire was disclosed in a social network it will have clearly more young people surveyed. For these reasons the questionnaire was applied to only young age groups.

Below the data that characterize the sample and subsequent analysis thereof will be presented, as well as data that characterizes the use of mobile services for each respondent.

In addition, and whenever necessary, that is when the amount of collected responses to certain groups of variables is reduced, these will be recoded in order to make a better analysis of the results.



### **5.1.1. Gender and age group**

Regarding the gender of the sample it is possible to see that the majority of respondents are female, accounting for about 63,1% of the sample, i.e. 257 respondents. With respect to male respondents this group represents about 36,9% of the sample corresponding to 150 respondents.

Regarding the age of respondents, we see that this is located essentially between 16 and 24 years (51,8%) and between 25 and 34 years (29,7%), corresponding to 211 and 121 respondents, respectively. The age groups between 10 and 15 years and between 35 and 44 were the least representative, the first shows only 3 respondents (0,7%) and the second has 72 (17,7%).

Through the graphic available in **Annex 3**, which shows the distribution of age groups in relation to each of the sexes, and as mentioned earlier, it is possible to check the concentration of responses in both sexes, aged between 16 and 24 years old. This is probably justified by the fact that the investigator having a network of friends in the social network with an age similar to her, i.e. in the event of her being older, most of the sample would be older too.

Furthermore, and due to lack of data collected on the group of respondents aged between 10 and 15 years, one proceeded with the recoding of the variable age, i.e., respondents were grouped within the group mentioned above to group of respondents aged 16 to 24 years. So the new group, called "Between 10 and 24", is now composed of 214 elements, corresponding to 52,6% of the sample.

### **5.1.2. Level of education**

With respect to the sample level of education, you can check back through the **Annex 4**, a skewing due, and as mentioned in the previous point, to the researcher's network of friends on the social network, in which the questionnaire was released directly.

Thus, the group "Bachelor's degree" is presented as the most significant, representing more than half of the sample, i.e., 213 respondents (52,3%). For the other groups, they are represented as follows: in the "Primary school: 4.º year" no response was obtained, in the "Elementary school: 6.º year" three responses (0,7%) were obtained, in the "Middle school: 9.º year" 16 replies (3,9%) were obtained, in "High school" 101 responses (24,8%) were obtained, "Master's degree" had 69 responses (17%), and lastly five respondents chose "Other" option (1,2% ).

Due to lack of data collected in certain groups, proceeded to the recoding of the variable "Level of education". Thus, basic education groups (Primary, Elementary and Middle school) and secondary education, formed group a single group called "No higher education." While the groups, "Bachelor's degree", "Master's degree" and "Other" also formed a group, called "Higher education."

Thus, the group "No higher education" consists of 93 respondents (22,9%) and "Higher Education" group consists of 287 respondents (70,5%).

### **5.1.3. Employment Status**

Regarding the employment status, you can verify by **Annex 5**, the "Employed" group and "Students" represent the majority of the sample in which the first corresponds to 264 respondents (64, 9%) and the second corresponds to 120 respondents (29,5%).

The remaining groups "Unemployed" and "Retired and other inactive" represent 19 (4,7%) and 4 (1%) respondents, respectively.

For reasons similar to the recoding performed in the variables "Age" and "Education level", a change was also made in the groups that make up this variable. Thus, the group "Unemployed" and the group "Retired and other inactive" were grouped into one, called "Without occupation", which consists of 23 respondents (5,7%).

### **5.1.4. Household income in 2015**

Regarding the household income of respondents last year, it can verify by **Annex 6**, that much of those had lower incomes, i.e. 71 respondents (17,4%) had an income below 10.000€ per year and 199 respondents (48,9%) had an income between 10.000€ and 27.500€ per year, corresponding to the most representative group of the sample.

Despite what was previously identified, respondents with a medium / high income are also considerable. Thus, the group "Between 27.501€ and 50.000€ per year" is represented by 98 respondents (24,1%), the group "Between 50.001€ and 100.000€ per year" is composed of 33 respondents (8,1%), and finally the group that has a higher income, that is, "More than 100.000€ per year" has only six respondents (1,5%).

This variable was no exception, so a recoding was also made, i.e. the group with an income between 50.001€ and 100.000€ per year and the group with income exceeding 100.000€ per year were grouped together ultimately forming the group called “More than 50.000€ per years”, represented by 39 respondents (9,6%).

#### **5.1.5. Mobile phone ownership**

As to the independent variable Mobile phone ownership, you can check through **Annex 7**, that only two of the respondents do not own a mobile phone, representing about 0,5% of the sample. Thus, the sample was reduced to 405 respondents, because if respondents answer that they did not own a mobile phone the questionnaire was ended, in the sense that they did not have enough information to answer the questions that would be asked later.

#### **5.1.6. Network operator**

Through **Annex 8** you can see that the respondents who say they own a mobile phone, 160 use the services of the network operator Vodafone (39,5%), 154 use the services of the network operator MEO (38%) and 85 (21%) the services of the network operator NOS. However, six of the respondents say they have a network operator different of the options available in the questionnaire.

#### **5.1.7. Contract time**

The independent variable Contract Time is critical because if respondents have a contract in the medium / long term, it may indicate that they are satisfied with the service provided by their network operator, otherwise it may indicate that the old network operator did not perform a quality service, leading the respondents to change their service provider.

According to the graph in **Annex 9**, the majority of respondents hold a contract with their network operator for more than a year. Thus, there are 49 respondents (16,1%) who hold a contract between one to two years, while 34 (11,1%) and 265 (86,9%) respondents hold a contract between two and three years and over three years, respectively. However, 12 respondents (3,9%) do not know how long they have used the services provided by their network operator.

This variable also suffered a recoding, so the groups of between "Less than 3 months" to "Between 9 months and 1 year" will all be joined together in a group, which will be called "Less than 1 year", and this is represented by 45 respondents (14,8%).

#### **5.1.8. Tariff Plan**

As for the variable Tariff Plan it can be verified through the chart in **Annex 10**, that 208 respondents had a prepaid plan, corresponding to 51,4% of the total. With regard to the postpaid plan, it holds less respondents, more specifically 166 (41%). However, 31 of the respondents (7,7%) did not know which tariff plan they had.

The results obtained through this independent variable go back to what was mentioned in point *3.3.2.1.Mobile stations / Active user equipments*, that is, there is a higher percentage of users who use the prepaid than the postpaid plans. However, this trend in the coming years can no longer be achieved, in the sense that the percentage of users who receive the postpaid plans has increased, contrary to the percentage of prepaid users that has been declining, situation which is justified in point *3.3.2.1.* previously mentioned.

#### **5.1.9. Service with greater importance**

In the questionnaire, we asked the respondents which service they attach greater importance. To address the issue mentioned above, the Internet and calls were considered as the most important, both represented by 159 respondents (39,3%) (see **Annex 11**). The SMS service was regarded as the most important by 87 respondents (21,5%).

#### **5.1.10. Staying with the current network operator**

This independent variable is also key, as is the variable "Contract Time", because in the case of respondents wanting to continue to take advantage of their current network operator services this may indicate that they are satisfied with the service, and vice versa.

Thus, through the chart in **Annex 12**, we can see that 370 customers (91,4%) of mobile telecommunications services intend to maintain the network operator, while only 35 customers (8,6%) intend to change.

## **5.2. Distribution analysis of the accordance of items**

The analysis that will be done in this point will be critical to assess the perceived quality of mobile telecommunications services provided by network operators, because it lets you know which items the customers are more and less satisfied.

### **5.2.1. Tangibility**

Through the graphs in **Annexes 13 and 14**, it is possible to see the accordance distribution obtained in the six items that are clustered in the Tangibility dimension, as well as the average of each of the items.

Given the above, both the second (The facilities of your network operator are attractive/appropriate), and the fifth item (The systems, equipment and their network operator tools are modern and effective) have the best average, corresponding to a score of 5,2 points. In these two items is noted that 175 (43%) and 189 of respondents (46,7%), respectively, responded to the aforementioned items with a score of six and seven points.

In contrast, the item that received the lowest score (4,6 points) was the fourth (The instructions about the products/services provided by your network operator are clear and self-explanatory), indicating a dissatisfaction of 78 respondents (19,3 %), which rated this item with a score inferior to four points.

### **5.2.2. Assurance**

With regard to the Assurance dimension, you can check through the graphs in **Annexes 15 and 16**, that the items which respondents are most dissatisfied are the first (Your network operator can perform its services on the first try) and the fourth (Your network operator provides information clearly and objectively), which have a score of 4,8 points. For these items, 64 respondents (15,8%) responded to the first item and 74 respondents (18,3%) responded to the fourth item with a score inferior to four points.

Conversely, the third item (The provision of services by the network operator occurs as contracted) was the one that got a better rating, reaching 5,2 points. Of the 405 respondents, 53 (13,1%) rated this item with a score inferior to four points.

It should also highlight that the average rating of all items of the Assurance dimension has little amplitude, i.e., from the lowest to the highest average there is only a difference of 0,4 points.

### **5.2.3. Responsiveness**

Of the six items that constitute the Responsiveness dimension, the fourth (The employees of the network operator have a response capacity in answering to the client's complaints) was the one that showed the lower average (4,6 points), that is, 76 of the respondents ( 18,8%) rated this item with a score ranging from one to three points (see **Annexes 17 and 18**).

The items that had a better score (5,0 points) were the second (Your network operator always tries to help you) and the third (The employees of your network operator are clear and objective in information they provide), in which 137 respondents (33 , 4%) and 154 (38%), respectively, rated these with a score of six or seven points.

As seen also in the Assurance dimension in the Responsiveness dimension the average rating of all items has a low amplitude, i.e., from the lowest to the highest average there is only a difference of 0,4 points.

### **5.2.4. Reliability**

Regarding the Reliability dimension, the item with best rating was the third (The employees of your network operator are always kind and polite to you), with 5.3 points in seven possible points, of which 41 respondents (10,1%) rated this item with a score inferior to four points (see **Annexes 19 and 20**).

On the other hand, the item with the lowest rating was the first (You feel safe regarding the information you provide to your network operator, because it will not disclose them or use them incorrectly), with an average of 4,8 points. Of the 405 respondents, 86 (21,2%) rated this item with a maximum score of four points.

### **5.2.5. Empathy**

As can be seen through the graphs in **Annexes 21 and 22**, the fifth item (Your network operator provides different means to contact it – shops, website, telephone line service for clients, e-mail and postal mail) of the Empathy dimension is the one with the best average rating (5,5 points). In this item with best average rating, 110 respondents (27,2%) totally agreed with the statement.

In contrast, the third statement (Your network operator is always looking for what is best for the client) has an average value of 4,6 points, and 69 of the respondents (17%) rated this item with a score inferior to four points.

#### **5.2.6. Communication, Availability Information and Tariff**

The items to be discussed at this point are not part of the initial structure of the SERVPERF model, however they correspond to specific attributes of the mobile telecommunications sector, as explained previously.

Through the graphs in **Annexs 23 and 24** it is possible to see that the Communication dimension consists of three items: (i) Your network operator has a good network coverage nationwide; (ii) Your network operator has a sufficient number of shops at the service of the client; (iii) The quality of voice calls made through your network operator is good. For the previously mentioned items, respondents rated them with an average of 5,3, 5,4 and 5,8 points, respectively. It's also noted that more than half of respondents answered the three items with six or seven points.

The Availability Information dimension consists of two items: (i) Your network operator provides adequate information; (ii) Your network operator announces ahead of time and in an appropriate way changes in your tariff, and the respondents rated them with 5,1 and 4,8 points, respectively. It should also be noted that the second item was the one that got the lowest rating, given the dimensions that are referred to in this issue, from which 73 of the respondents (18%) rated it with a score inferior to four points.

Finally, the Tariff dimension also consists of two items: (i) The value for money of services provided by your network operator is appropriate; (ii) The payment methods provided by your network operator are appropriate, which were also classified positively, that is, the first item scored a value of 4,8, while the second item obtained a higher average of 5,6 points. It is noteworthy that more than half of respondents, more specifically 239 respondents (59%) ranked the last item with six or seven points.

### **5.3. Reliability of the SERVPERF instrument**

In order to test the reliability of SERVPERF instrument, Cronbach's coefficient alpha will be calculated. Maroco and Garcia-Marques (2006:73) state that *“The index  $\alpha$  estimates how*

*uniformly the items contribute to the non-weighted sum of the instrument, with a scale ranging from 0 to 1*".E This coefficient is a internal consistency measure of a scale (in this case, the Likert scale), which is usually used as an estimate of the reliability of a psychometric test for a sample of respondents (Pereira & Patrício, 2013). Thus, when calculating this coefficient will be possible to verify whether the instrument used in the study is reliable or not.

Also according to Pereira and Patrício (2013), the values of Cronbach's alpha coefficient should be interpreter according to the table below:

Cronbach's Alpha Coefficient	Internal consistency
1 – 0,90	Very good
0,70 – 0,90	Good
0,60 – 0,70	Acceptable
0,50 – 0,60	Weak
< 0,50	Unacceptable

As you can see in the table below, both the original five dimensions of the SERVQUAL model and the other dimensions that were added later, have an estimated value of Alpha Cronbach higher than 0,70. Thus, it is clear that the scale has a good consistency (Tangibility; Reliability; Empathy; Communication; Availability Information; and Tariff) and very good (Assurance and Responsiveness).

Dimension	Cronbach's Alpha Coefficient
Tangibility	0,811
Assurance	0,912
Responsiveness	0,949
Reliability	0,862
Empathy	0,831
Communication	0,835
Availability Information	0,786
Tariff	0,742

Given the above, it is concluded that the instrument of quality measure that is being used has internal consistency.



#### **5.4. Characterization of the profile of averages in dimensions compared to the overall sample**

When making an overall analysis of the results, you can see that the average level of correlation with the eight dimensions of analysis is 5,04 points on a scale of seven, and this average is not weighted in relation to the number of items in each dimension. However, the value of the unweighted average is not very different from the value of the average ratings of all items, which is 5,00 points.

According to the graph found in **Annex 25**, it can be seen that the Communication dimension is the one that has a higher degree of agreement between the respondents, 5,49 points. On the other hand the Responsiveness dimension is the one that presents a lower degree of concordance with 4,83 points.

#### **5.5. Characterization of the profile of dimensions's averages given the independent variables**

In order to check the impact of each independent variable in the quality perception of respondents, hypothesis testing will be carried out in order to test the existence of differences in the groups that compose them.

The tests may be parametric or non-parametric, and, as mentioned by Pereira and Patrício (2013:138), the first ones have the following requirements:

- ▶ “...requires that it is possible to carry out numerical operations on the experimental data. It is not enough that you can just sort the data, as in the non-parametric tests. The variables must be naturally numeric, as a continuum of reading times, or the grade of an exam.”;
- ▶ “...forces the results to be normally distributed. However, since parametric tests are quite robust, they can be used even when this assumption is violated, unless the data has a very different distribution from the norm.”; and,
- ▶ “...homogeneity of variance. This means that the variability of the results in each case should be substantially the same. However, this requirement loses its relevance if the number of subjects is the same in each experimental situation.”.

In the event that the requirements of parametric tests are not fulfilled, non-parametric tests will be performed.

In this study it was not possible to verify the second condition, namely, the normality of distributions, using the Kolmogorov-Smirnov test (Annex 26 to Annex 35) because the results were significant, with a p-value lower than 5%, for the majority of the variables in study, one can, even conclude that normality on the sample cannot be assumed. Therefore though the results were not significant (p-value higher than 5%) - and hence normality could be assumed - for some variables, it was deemed as appropriate to conduct the study focusing only on non-parametric tests.

This decision will allow to draw more reliable conclusions in the end since non-parametric tests do not assume normality on the distribution of the sample, opposing to parametric ones. Even the variables where normality could be assumed will be tested by non-parametric tests to facilitate the comparison with the others, enabling to draw more consistent and coherent conclusions.

Therefore it only nonparametric tests will be performed. These tests allow us to test the equal distribution of an independent variable for each one of its groups. However, and whenever the variable is composed by two groups, such as the variable "Gender", the Mann-Whitney test will be performed, if the variable is composed of more groups, then the Kruskal-Wallis test is used.

Thus, both tests (Mann-Whitney and Kruskal-Wallis) have the following hypotheses:

$H_0$ .: the distribution of the independent variables is the same for the various population groups that compose them.

$H_1$ .: the distribution of the independent variables is not the same for the various population groups that compose them.

These tests can be used to reject or not reject the null hypothesis which states that the sample averages are the same for the different groups, and for this it is necessary that the shape of the distributions is the same for the groups for each variable. Moreover, whenever the *sig* is under the significance level of 0,05, the null hypothesis is rejected.

The results obtained from these tests will be beneficial in order to be able to conclude about the possible existence of statistically significant differences between the distributions of each group of independent variables in analysis.

### **5.5.1. Profile of averages of dimensions against Gender**

As mentioned in the previous paragraph, since the independent variable gender is composed of two groups, female and male, we recommend using the Mann-Whitney test.

Through the table available in **Annex 36**, it's possible to see that all dimensions obtained a sig higher than 0,05. Thus, the null hypothesis is not rejected, i.e., there are no significant differences in the distribution of the groups "Female" and "Male" in each of these dimensions.

According to chart available in **Annex 37**, there is the existing congruence between the results obtained in the test, except for the dimensions Responsiveness and Availability Information, but these differences are not significant.

### **5.5.2. Profile of averages of dimensions against Age Group**

The age variable was recoded as referred to in point *5.1.1. Gender and age group* and is now composed of three groups: "Between 10 and 24 years"; "Between 25 and 34 years"; "Between 35 and 44 years". Thus, for this variable we will be using the Kruskal-Wallis test.

According to the table available in **Annex 38**, it is possible to verify the results obtained through the test, and the Tariff dimension has a value below the accepted level of significance (0,05), so that we will reject the null hypothesis. Thus, it is confirmed that there are significant differences in the distribution between the three age groups.

With regard to the other dimensions, these obtained results higher than 0,05, so we do not reject the null hypothesis of the test. That said, there are no significant differences between the distributions of the three groups of the variable "age group".

Through the graph in **Annex 39**, in which the average profile of the dimensions for each analysis group is visible, it can be seen that the group "Between 35 and 44 years" classifies on average, worst in each dimension except the dimensions Responsiveness and Reliability.

### **5.5.3. Profile of averages of dimensions against the level of education**

After recoding the variable "Level of education", this now composed only by two groups: "Non-higher education" and "Higher education". Thus, and as mentioned earlier, the Mann-Whitney test is used.

Through the table available in **Annex 40**, it is possible to see that all dimensions obtained a *sig* higher than 0,05. Thus, the null hypothesis is not rejected, that is, there are no significant differences in the distribution of the two groups in each of these dimensions.

Through the observation of the graph which is in **Annex 41**, we can see that respondents with higher education tend on average to assign a higher ranking in all dimensions.

#### **5.5.4. Profile of averages of dimensions against the Employment Status**

The variable Employment Status was no exception and it was also subject to a recoding, consisting then of only three groups: “Employed”, “Student” and “Without occupation”. Thus, the Kruskal-Wallis test was used.

Through the table in **Annex 42**, it is confirmed that no dimension has a value lower than the accepted level of significance. This means that the null hypothesis is not rejected, with no statistically significant differences between the distributions of the groups of this independent variable.

According to the chart available in **Annex 43**, it should be noted that the group of respondents “Employed” assigns on average worse ratings to all dimensions when compared to the other two groups. In addition, the group of “Students” surveyed attributes on average, worst ratings to all dimensions when compared to the group of respondents with “No occupation” except for the Communication dimension.

#### **5.5.5. Profile of averages of dimensions against the gross income of the household in 2015**

The family income variable was also subject to a recoding of its groups, so this now consists of only four groups: “Less than 10.000€ per year”; “Between 10.000€ and 27.500€ per year”; “Between 27.501€ and 50.000€ per year”; “More than 50.000€ per year”.

According to the table available in **Annex 44** it should be noted that the null hypothesis is not rejected because none of the dimensions has a value under 0,05. As such, there are no statistically significant differences between the groups in this variable.

Through the graph in **Annex 45**, it is clear that the group "More than € 50,000 per year" gives, in general, better ratings in all dimensions except in the Responsiveness dimension.

However, one can not claim that as income increases, the satisfaction demonstrated by respondents increases. This statement is justified to the extent that the group "Between € 27,501 and € 50,000 per year" gives, in general, the worst ratings in all dimensions compared to the rest of the groups.

#### **5.5.6. Profile of averages of dimensions against the network operator**

The variable Network operator consists of four groups: "MEO"; "NOS"; "Vodafone"; "Other". With this feature, we recommend using Kruskal-Wallis nonparametric test.

By observing the table in **Annex 46**, it should be noted that all dimensions have values under 0,05, so the null hypothesis is rejected. It can therefore be concluded that there are significant differences in the distributions of the four groups of the variable network operator.

When analyzing the graph available in **Annex 47**, you can confirm that the group of respondents who have another network operator is, in general, more satisfied than other groups. With regard to the "Vodafone" group, immediately after "Other" group, it can be observed that it is the one that is more satisfied for all dimensions except regarding Reliability dimension. On the other hand, the respondents of the group "MEO" are, in general, less satisfied than respondents of the group "NOS", except with regard to the Communication dimension.

#### **5.5.7. Profile of averages of dimensions against contract time**

The variable Contract time consists of five groups: "Less than 1 year"; "Between 1 and 2 years"; "Between 2 and 3 years"; "More than 3 years"; "Does not know". It is therefore advisable to use the non-parametric Kruskal-Wallis test.

Through the table in **Annex 48**, it is clear that only the Communication dimension obtained a value under 0,05, rejecting the null hypothesis of this dimension. That is, while for this dimension there are statistically significant differences in the distributions of the groups, for the remaining dimensions we find that the opposite happens.

According to the graph that is in **Annex 49**, it can be seen that the satisfaction of respondents did not increase with the increasing time of contract, and vice versa. However, both the group "Between 2 and 3 years" and the group "More than 3 years" are those who are most satisfied regarding the dimensions of Tangibility, Reliability, Empathy, Communication and Tariff.

#### **5.5.8. Profile of averages of dimensions against the tariff plan**

The variable Tariff plan is composed of three groups: “Prepaid”; “Postpaid”; “Does not know”. Given the above, it is advisable to use the nonparametric Kruskal-Wallis test.

Available through the table in **Annex 50**, it is clear that only the Tariff dimension obtained a value under 0,05, rejecting the null hypothesis of this dimension. That is, while for this dimension there are statistically significant differences in the distributions of the groups, for the remaining dimensions it's the opposite.

Observing the graph in **Annex 51**, we can see that respondents from the group "Prepaid" are more satisfied than the other groups. On the other hand, respondents who do not know what their tariff plan is, in general, are more satisfied on the various dimensions than the respondents of the group "Postpaid", except in the dimensions Assurance and Communication.

#### **5.5.9. Profile of averages of dimensions against service with greater importance**

The independent variable "Service with greater importance" consists of five groups: “Voice calls”; “SMS”; “MMS”; “Internet”; “Other”. However, the respondents only selected the first three aforementioned groups. Thus, one uses the nonparametric Kruskal-Wallis in the analysis of the equality of distributions.

As can be seen in the table contained in **Annex 52**, all dimensions are higher than the permitted level of significance. Thus, it can be concluded that these dimensions have similar distributions in the three groups of the variable “Service with greater importance”.

Through the graph available in **Annex 53**, you can confirm that there are no visible differences between the three groups in the variable's analysis.

#### **5.5.10. Profile of averages of dimensions against staying with the current network operator**

The last independent variable to be analyzed, staying with the current network operator, consists of two groups: “Yes”; “No”. Thus, the nonparametric test to be used to test the equality of distributions is the Mann-Whitney test.

Observing the table in **Annex 54**, you can confirm that only the Communication dimension obtained a significance level higher than 0,05. In other words, this dimension has a similar

distribution in each of the groups that make up the variable "staying with the current network operator.

On the other hand, the remaining dimensions had values under 0,05 so the null hypothesis was rejected. Thus, it can be concluded that there is at least one group with a statistically different distribution of other groups in each dimension, excluding the Communication dimension.

According to the graph shown in **Annex 55**, it is clear that the group of respondents who intends to stay with the same current network operator classifies, on average, more positively the various dimensions than the respondents of the group who wish to change their current network operator.

## **5.6. Principal Component Analysis (“PCA”)**

The PCA second to Maroco (2007 : 329) is *“an explanatory multivariate analysis technique that converts a set of correlated variables into a smaller set of independent variables, linear combinations of the original variables called principal components”*.

Given the above, and in order to test the correlation between the original variables, we used the Kaiser-Meyer-Olkin ("KMO") statistic and the Bartlett test.

The KMO statistic varies between 0 and 1 and is a measure of the adequacy of the sample collected for carrying out the PCA. Values above 0,6 are considered to be acceptable for the preparation of this analysis. Thus, as can it be seen in the table presented in **Annex 56**, the KMO test showed a value of 0.966, leading to the conclusion that the sample is suitable for carrying out the proposed analysis.

Bartlett's test is a hypothesis test for the null hypothesis that the correlation matrix is an identity matrix, i.e, the original variables are uncorrelated. Thus, in order to perform the PCA it's important to reject the null hypothesis of the Bartlett test, that happens in this case because, and as you can check in **Annex 57**, the  $sig=0,000$ , indicating that the variables are actually correlated among themselves.

In the same segment, and verifying the conditions necessary for the PCA it will be necessary to make a decision about the number of major components more suitable for this particular case. Thus, the criterion chosen was the Kaiser, which is to retain or extract the main components with an explained variance higher than 1.

Through analysis of the table XX, only three main components should be retained, which explains almost 63% of the total variance of the 33 original variables.

In view of the foregoing, and in order to facilitate the task of interpretation, a rotation of the obtained solution was performed with the Varimax method. This rotation aims to produce a simplified structure, i.e., a solution in which each principal component the variation of the correlation of initial variables is maximized. In this way, and for each major component, we shall have variables with high correlations (positive or negative) and variables with low correlations (negligible for the interpretation of the solution). The resulting solution is then analyzed from the higher correlations between baseline variables and each of the main components, as can be seen in the Rotated Component Matrix (see **Annex 58**).

In order to simplify the interpretation of the results, the items that make up each of the new components will be presented, and a name will be proposed to characterize.

The main component 1 consists of the following 24 items:

- ▶ As a user, when you have an unresolved situation, your network operator demonstrates determination to solve it;
- ▶ Your network operator is effective in solving problems;
- ▶ Your network operator always tries to help you;
- ▶ Your network operator provides a quick and efficient service;
- ▶ The employees of your network operator are clear and objective in information they provide;
- ▶ The employees of the network operator have a response capacity in answering to the client's complaints;
- ▶ Your network operator always provides information about when the contracted services will be performed;
- ▶ Your network operator provides information clearly and objectively;
- ▶ Your network operator is always looking for what is best for the client;
- ▶ The employees of your network operator have the expertise to answer the questions you ask them;
- ▶ Your network operator can perform its services on the first try;



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- ▶ Your network operator provides adequate information;
- ▶ Your network operator meets the deadlines;
- ▶ The employees of your network operator transmit you confidence and make you feel safe;
- ▶ The provision of services by the network operator occurs as contracted;
- ▶ Your network operator announces ahead of time and in an appropriate way changes in your tariff;
- ▶ Your network operator provides you with individualized attention and personalized service (e.g. indicating the best tariff, i.e. which best suits your needs);
- ▶ The value for money of services provided by your network operator is appropriate;
- ▶ The instructions about the products / services provided by your network operator are clear and self-explanatory;
- ▶ The employees of your network operator are always kind and polite to you;
- ▶ You feel safe regarding the information you provide to your network operator, because it will not disclose them or use them incorrectly;
- ▶ Your network operator has a better image than compared to its competitors;
- ▶ The systems, equipment and their network operator tools are modern and effective; and,
- ▶ Your network operator provides entertainment during the waiting time (e.g. background music, magazines, television, etc.).

Briefly, this component consists of three items of the dimension Tangibility, five items of Assurance dimension, six items of the Responsiveness dimension, four items for the Reliability dimension, three items for the Empathy dimension, two items of the Availability Information dimension and one item of the Tariff dimension. Thus, this dimension was renamed Service Provider.

The main component 2 consists of the following six items:

- ▶ Your network operator has a sufficient number of shops at the service of the client;
- ▶ The quality of voice calls made through your network operator is good;
- ▶ Your network operator has a good network coverage nationwide;

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- ▶ The payment methods provided by your network operator are appropriate;
- ▶ Your network operator provides different means to contact it (shops, website, telephone line service for clients, e-mail and postal mail); and,
- ▶ Your network operator has working and service hours appropriate to many of its client's.

Briefly, this component is composed by three items of the Communication dimension, one item of the Tariff dimension and two items of the Empathy dimension. Thus, the component will be called Accessibility and Communication.

The main component 3 consists of the following three items:

- ▶ The employees of your network operator have a groomed appearance and dress appropriately for the functions they perform;
- ▶ Your network operator has good accessibility for the disabled (walking difficulties, communication difficulties, etc.); and,
- ▶ The facilities of your network operator are attractive / appropriate.

Finally, the third major component is formed by three items of the Tangibility dimension. Thus, to the extent that the items all come from the initial dimension Tangibility, the description of this third principal component will remain the same.

## 6. FINAL CONCLUSIONS

In this chapter we will present the main findings of the study by answering the questions in point *1.3. Research problem*. Furthermore, recommendations to improve service quality will be exhibited as well as the limitations of the study.

### 6.1. Main conclusions

Through the analysis of the 407 collected questionnaires it will be possible to evaluate the quality perceived by customers of mobile telecommunications services.

Of the eight dimensions analyzed in this study, it's possible to see that the dimension that obtained the best average rating with respect to the quality perceived by customers was Communication, but only with a difference of 0,29 points in comparison to the Tariff dimension. In contrast, the Responsiveness dimension was the one that had the worst average rating.

With regard to the analysis of the 33 items used to measure the perceived quality of mobile telecommunications services, it is found that three of these stand out for having got the worst ratings, namely: (P4) The instructions about the products/services provided by your network operator are clear and self-explanatory; (P15) The employees of the network operator have a response capacity in answering to the client's complaints; (P24) Your network operator is always looking for what is best for the client. Conversely, the items that had better classification were as follows: (P26) Your network operator provides diferente means to contact it (shops, website, telephone line service for clientes, e-mail and postal mail); (P29) The quality of voice calls made through your network operator is good and (P33) The payment methods provided by your network operator are appropriate.

Then, and as discussed in section 6.2. above, it was found that the eight dimensions of the study were internally consistent, since the estimated value of the Alpha Cronbach coefficient for each of the dimensions was always higher than 0,7.

Given the above, it is clear that the first and second questions raised in point *1.3. Research problem* are properly answered.

Then, and in order to answer the third question, an analysis of all dimensions was made against the independent variables, having been used for the same two statistical tests: Mann-Whitney and Kruskal-Wallis. Regarding the independent variables "Gender" and "Service with greater importance" you can not draw broad conclusions, since no significant differences were found between the groups that make them up, regarding any dimension. With regard to the other variables significant differences were observed in the data obtained, so it is possible to present the following conclusions:

- ▶ Age group: the respondents belonging to the group "Between 35 and 44 years" rank on average more negatively the dimensions analyzed, except the Responsiveness and Reliability dimensions. Moreover, the Tariff dimension presents significant differences in its distribution;
- ▶ Education level: respondents belonging to the group "Higher education" attribute, on average, better ratings in all dimensions than the respondents belonging to the group "Non-higher education";
- ▶ Employment status: ranks on average more negatively all dimensions analyzed than the other groups of the independent variable. Regarding the groups "Student" and "Without occupation", the first allocates on average, worst ratings than the second, except the in Communication dimension;
- ▶ Income: the group "More than 50.000€ per year" gives, in general, a better classification to all dimensions except the Responsiveness dimension. However, it does not mean that as income increases, the satisfaction perceived by respondents increases as well, because the group "Between 27.501€ and 50.000€ per year" gives, in general, the worst ratings in all dimensions than all other groups;
- ▶ Network operator: significant differences were found between the groups in this variable in all dimensions. So we can say that the respondents belonging to the "Other" group classified, on average, more positively all analyzed dimensions. Followed by, in general, the "Vodafone" group, "NOS" and finally "MEO";
- ▶ Contract time: the Communication dimension was the only one to show statistically significant differences. It should be noted that the satisfaction of respondents does not increase with the increase of contract time with the network operators. However, the group "Between 2 and 3 years" and the group "More than 3 years" are the ones who are

more satisfied with most dimensions (Tangibility, Empathy, Communication and Tariff);

- ▶ Tariff Plan: the Tariff dimension was the only dimension that showed significant statistical differences. Moreover, the "Prepaid" group is the one that is more satisfied, when compared to all other groups, with the dimensions analyzed. Followed by, in a general way, the group "Does not know" and finally the group "Postpaid";
- ▶ Staying with the current network operator: the Communication dimension was the only one that did not achieve statistically significant differences between the groups that make up this independent variable. It was found that respondents who intend to maintain their current network operator, on average, classify more positively the various dimensions than the respondents who intend to change.

Finally, and in order to answer the fourth question, the PCA was executed in order to regroup the items belonging to the study, whose grouping criterion was a greater correlation between all items. Thus, the eight initial dimensions now become only three dimensions, known as Service Provider, Accessibility and Communication e Tangibility.

## **6.2. Recommendations for improvement of quality of service**

First of all, it should be noted that none of the items analyzed in the study got an average under 4,6 points. Thus, it is clear to say that customers of mobile telecommunications services in general, are in agreement with the items analyzed, revealing a satisfaction with the quality of the items. This statement is consistent with the results obtained in the last question of the questionnaire (How would you rate, overall, the quality of services provided by your network operator), i.e. 77% of respondents attributed, overall, to the quality of services performed by their network operator a rating between 5 and 7 points.

However, and as mentioned in point *1.2.Research objectives*, one of the goals of this research is to suggest specific measures to enable the improvement of the perceived quality of customers of mobile telecommunications services, which are now presented:

- ▶ Proximity policy: aspects related to trust, security and relationship between customers and network operators were those that had a worse rating (P18; P19; P22 and P24). In order to increase customer satisfaction we will need to create a close relationship with them, which may be done through an increased of direct, personalized and

individualized contact. Thus, the customer will have a greater perception of the work performed by network operators.

- ▶ Execution of the service: some of the items related to the completion of service of network operators were not so well ranked in relation to others (P7; P11; P12; P15 and P16). The provision of a service, such as attending to customer complaints can only be well executed, that is, be fast, efficient, effective, among others, if employees of network operators have the necessary knowledge, as well as the equipment available for completion of the service. Thus, knowledge of workers may be encouraged by, for example, regular training. With respect to equipment, the network operator must introduce, whenever possible, more current ones, in order to facilitate the service.
- ▶ Dissemination / disclosure of information: often the dissemination / disclosure of information is not made in advance, clearly and objectively, which justifies the classification made by the respondents for certain items (P4; P10; P17; P21 e P31). Incorrect dissemination / disclosure of information can have serious consequences for customers, such as ignorance on the part of these of new campaigns, changes in tariffs, as well as a bad interpretation of the information obtained about the mobile telecommunications services. In order to bridge this gap, it is advisable, once again, that the workers of network operators have regular training so that they are able to give the correct information, and thus able to answer all questions put to them. In addition, information on new campaigns, tariff changes, among others, may be made in a more personalized and individualized way in order to hold the attention of customers.
- ▶ Facilities: the facilities where mobile telecommunications services are provided should be tailored to the needs of all customers, and should give the greatest possible comfort to those that visit them. However, sometimes this is not the reality, such as in the case of disabled people who do not always have the facilities adapted to their needs. In parallel, and as seen through the scores given by the respondents to item P6, the existing entertainment during the customer's waiting time in order to be served is not the best. Thus, it is advisable that all network operators to adapt their facilities, so that they are properly prepared to receive any type of customer, making them want to return to the facilities.

### **6.3. Study limitations**

Next we will be presenting briefly some of the main limitations found throughout this dissertation.

One of the limitations revealed in this study is related to the difficulty in obtaining the required amount of completed questionnaires. Although, having obtained the 407 questionnaires in just two days, it was necessary to share the questionnaire several times asking people to fill in the questionnaire, because not all people shown themselves available. Otherwise, it would've been enough that the investigator just shared the questionnaire, since she had 1000 direct contacts.

Another limitation identified was that in some places the sample seem biased, as can be seen in the following variables: "Gender" (about 64% of respondents are female); "Level of education" (about 71% of respondents belong to "Higher education"); "Employment Status" (the group "Without Occupation" is only about 6% of respondents). The bias shown above may be a result of how the sample was collected, as well as the availability of respondents.

Moreover, it was not taken into account the influence of the emotional component of each respondent in answering the questionnaire, which may have influenced the results, constituting also a limitation to the study.

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## 8. ANNEXS

### Annex 1: Questionnaire in english

#### Master's Thesis Questionnaire

Dear participant,

My name is Catarina Martins and I'm a finalist of the Master's degree in Management from ISCTE-IUL. I am currently focusing my masters thesis on the evaluation of the quality of mobile services.

So I would ask for your cooperation in order to complete the thesis. To do this, just answer the questions that will be asked, the only purpose of this questionnaire is to know your opinion on the subject in question, so there are no right or wrong answers.

It should also be noted that your answers will always be anonymous and used exclusively for this academic study.

Given the above, if you have any questions regarding the survey or study, or if you want to be informed about the results of it, you can send an email to [martins.catarina93@gmail.com](mailto:martins.catarina93@gmail.com).

Thank you very much.

**\*Obrigatório**

**1. State your gender \***

*Marcar apenas uma oval.*

- Female  
 Male

**2. State your age group \***

*Marcar apenas uma oval.*

- Between 10 and 15 years old  
 Between 16 and 24 years old  
 Between 25 and 34 years old  
 Between 35 and 44 years old

**3. What is the highest level of education you completed? \***

*Marcar apenas uma oval.*

- Primary school (4.º year)  
 Elementary school (6.º year)  
 Middle school (9.º year)  
 High school (12.º year)  
 Bachelor's degree  
 Master's degree  
 Other

**4. What is your employment status? \***

*Marcar apenas uma oval.*

- Student
- Employed
- Unemployed
- Retired and other inactive

**5. What is the gross income of your household in 2015? \***

*Marcar apenas uma oval.*

- Less than 10.000€ per year
- Between 10.000€ and 27.500€ per year
- Between 27.501€ and 50.000€ per year
- Between 50.001€ and 100.000€ per year
- More than 100.000€ per year

**6. Do you have a mobile phone? \***

*Marcar apenas uma oval.*

- Yes
- No

**7. What is your network operator? \***

*Marcar apenas uma oval.*

- NOS
- MEO
- Vodafone
- Other

**8. How long have you been a client of the network operator you indicated in the previous question? \***

*Marcar apenas uma oval.*

- Less than 3 months
- Between 3 to 6 months
- Between 6 and 9 months
- Between 9 months and 1 year
- Between 1 and 2 years
- Between 2 to 3 years
- More than 3 years
- Does not know

**9. What is your tariff plan? \***

*Marcar apenas uma oval.*

- Prepaid
- Postpaid
- Does not know

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**10. What is the service that you assign greater importance? \***

*Marcar apenas uma oval.*

- Voice calls
- SMS
- MMS
- Internet
- Other

**11. You want to keep your current network operator? \***

*Marcar apenas uma oval.*

- Yes
- No

**12. The employees of your network operator have a groomed appearance and dress appropriately for the functions they perform \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

**13. The facilities of your network operator are attractive / appropriate \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

**14. Your network operator has good accessibility for the disabled (walking difficulties, communication difficulties, etc.) \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

**15. The instructions about the products / services provided by your network operator are clear and self-explanatory \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

**16. The systems, equipment and their network operator tools are modern and effective \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

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17. **Your network operator provides entertainment during the waiting time (e.g. background music, magazines, television, etc.) \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

18. **Your network operator can perform its services on the first try \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

19. **Your network operator meets the deadlines \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

20. **The provision of services by the network operator occurs as contracted \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

21. **Your network operator provides information clearly and objectively \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

22. **As a user, when you have an unresolved situation, your network operator demonstrates determination to solve it \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

23. **Your network operator provides a quick and efficient service \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

Assessment of the Quality of Mobile Telecommunications Services

24. **Your network operator always tries to help you \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

25. **The employees of your network operator are clear and objective in information they provide \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

26. **The employees of the network operator have a response capacity in answering to the client's complaints \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

27. **Your network operator is effective in solving problems \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

28. **Your network operator always provides information about when the contracted services will be performed \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

29. **You feel safe regarding the information you provide to your network operator, because it will not disclose them or use them incorrectly \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

30. **The employees of your network operator transmit you confidence and make you feel safe \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

Assessment of the Quality of Mobile Telecommunications Services

31. **The employees of your network operator are always kind and polite to you \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

32. **The employees of your network operator have the expertise to answer the questions you ask them \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

33. **Your network operator provides you with individualized attention and personalized service (e.g. indicating the best tariff, i.e. which best suits your needs) \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

34. **Your network operator has working and service hours appropriate to many of its client's \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

35. **Your network operator is always looking for what is best for the client \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

36. **Your network operator has a better image than compared to its competitors \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

37. **Your network operator provides different means to contact it (shops, website, telephone line service for clients, e-mail and postal mail) \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree



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38. **Your network operator has a good network coverage nationwide \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

39. **Your network operator has a sufficient number of shops at the service of the client \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

40. **The quality of voice calls made through your network operator is good \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

41. **Your network operator provides adequate information \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

42. **Your network operator announces ahead of time and in an appropriate way changes in your tariff \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

43. **The value for money of services provided by your network operator is appropriate \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

44. **The payment methods provided by your network operator are appropriate \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly agree

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45. How would you rate, overall, the quality of services provided by your network operator \*

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Very weak	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excellent

---

## Annex 2: Questionnaire in portuguese

### Questionário Tese de Mestrado

Caro(a) participante,

O meu nome é Catarina Martins e sou finalista do Mestrado de Gestão do ISCTE-IUL. Neste momento estou a realizar a tese de mestrado no âmbito da avaliação da qualidade dos serviços de telecomunicações móveis.

Assim, gostaria de solicitar a sua colaboração para conseguir finalizar a tese. Para tal, basta responder às questões que lhe serão colocadas seguidamente, sendo que o único intuito deste questionário é saber a sua opinião sobre o tema em causa, pelo que não existem respostas certas ou erradas.

É de salientar ainda que as suas respostas serão sempre anónimas e utilizadas exclusivamente para o referido estudo académico.

Face ao exposto, se tiver alguma dúvida relativamente ao questionário ou ao estudo, ou se quiser ser informado(a) acerca dos resultados do mesmo, pode enviar um e-mail para [martins.catarina93@gmail.com](mailto:martins.catarina93@gmail.com).

Muito obrigada.

**\*Obrigatório**

#### 1. Refira o seu género \*

*Marcar apenas uma oval.*

- Feminino  
 Masculino

#### 2. Refira a sua faixa etária \*

*Marcar apenas uma oval.*

- Entre os 10 e os 15 anos  
 Entre os 16 e os 24 anos  
 Entre os 25 e os 34 anos  
 Entre os 35 e os 44 anos

#### 3. Qual o nível mais elevado de escolaridade concluído? \*

*Marcar apenas uma oval.*

- Ensino básico: 1.º ciclo (4.º ano)  
 Ensino básico: 2.º ciclo (6.º ano)  
 Ensino básico: 3.º ciclo (9.º ano)  
 Ensino secundário (12.º ano)  
 Licenciatura  
 Mestrado  
 Outro

**4. Qual a sua situação profissional? \***

*Marcar apenas uma oval.*

- Estudante
- Empregado(a)
- Desempregado(a)
- Refomado(a) e outros inativos

**5. Qual o rendimento bruto do seu agregado familiar no ano de 2015? \***

*Marcar apenas uma oval.*

- Menos de 10.000€ por ano
- Entre 10.000€ e 27.500€ por ano
- Entre 27.501€ e 50.000€ por ano
- Entre 50.001€ e 100.000€ por ano
- Mais de 100.000€ por ano

**6. Tem telemóvel? \***

*Marcar apenas uma oval.*

- Sim
- Não *Pare de preencher este formulário.*

**7. Qual é o seu operador de rede? \***

*Marcar apenas uma oval.*

- NOS
- MEO
- Vodafone
- Outro

**8. Há quanto tempo é cliente do operador de rede que indicou na questão anterior? \***

*Marcar apenas uma oval.*

- Menos de 3 meses
- Entre 3 a 6 meses
- Entre 6 a 9 meses
- Entre 9 meses e 1 ano
- Entre 1 a 2 anos
- Entre 2 a 3 anos
- Mais de 3 anos
- Não sabe

**9. Qual o seu plano de tarifário? \***

*Marcar apenas uma oval.*

- Pré-pago
- Pós-pago
- Não sabe

10. Qual o serviço a que atribui maior importância? \*

Marcar apenas uma oval.

- Chamadas de voz
- SMS
- MMS
- Internet
- Outro: .....

11. Pretende manter o seu operador de rede atual? \*

Marcar apenas uma oval.

- Sim
- Não

12. Os funcionários do seu operador de rede têm uma aparência cuidada e vestem-se de forma adequada às funções que exercem \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

13. As instalações físicas do seu operador de rede são atraentes/adequadas \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

14. O seu operador de rede é acessível a clientes portadores de deficiência (dificuldades de locomoção, de comunicação, entre outros) \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

15. As instruções sobre os produtos/serviços disponibilizados pelo seu operador de rede são claras e autoexplicativas \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

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16. Os sistemas, equipamentos e ferramentas do seu operador de rede são modernos e eficazes \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

17. O seu operador de rede dispõe de entretenimento durante o tempo de espera (por exemplo: música ambiente; revistas; televisão; entre outros) \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

18. O seu operador de rede consegue executar à primeira os seus serviços \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

19. O seu operador de rede cumpre com os prazos estipulados \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

20. A prestação dos serviços por parte do seu operador de rede ocorre conforme contratado \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

21. O seu operador de rede disponibiliza informações com clareza e objetividade \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

## Assessment of the Quality of Mobile Telecommunications Services

22. Enquanto utente, quando tem uma situação por resolver, o seu operador de rede demonstra determinação e resolvê-la \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

23. O seu operador de rede presta um atendimento rápido e eficiente \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

24. O seu operador de rede procura sempre ajudá-lo \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

25. Os funcionários do seu operador de rede são claros e objetivos na informação prestada \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

26. Os funcionários do seu operador de rede têm capacidade de resposta no atendimento às reclamações dos clientes \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

27. O seu operador de rede é eficaz na resolução de problemas \*

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

28. **O seu operador de rede disponibiliza sempre a informação sobre quando os serviços contratados serão executados \***

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

29. **Sente-se seguro relativamente às informações que presta ao seu operador de rede, pois este não irá divulgá-las nem serão incorretamente utilizadas \***

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

30. **Os funcionários do seu operador de rede transmitem-lhe confiança e segurança \***

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

31. **Os funcionários do seu operador de rede são sempre gentis e educados para consigo \***

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

32. **Os funcionários do seu operador de rede têm os conhecimentos necessários para responder às questões que lhes são colocadas \***

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

33. **O seu operador de rede presta-lhe uma atenção individualizada e um atendimento personalizado (por exemplo: indicando qual o melhor tarifário, ou seja, qual se adequa melhor às suas necessidades) \***

Marcar apenas uma oval.

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente



34. **O seu operador de rede tem horários de funcionamento e de atendimento apropriados a grande parte dos seus clientes \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

35. **O seu operador de rede procura sempre o que é melhor para o cliente \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

36. **O seu operador de rede tem uma imagem melhor face à dos concorrentes \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

37. **O seu operador de rede faculta diferentes meios para o contactar (lojas; website; atendimento por linha telefónica, correio eletrónico e correio postal) \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

38. **O seu operador de rede dispõe de uma boa cobertura de rede a nível nacional \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

39. **O seu operador de rede dispõe de uma quantidade suficiente de lojas ao serviço do cliente \***

*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

Assessment of the Quality of Mobile Telecommunications Services

40. **A qualidade da voz das chamadas efetuadas através do seu operador de rede é boa \***  
*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

41. **O seu operador de rede disponibiliza informação adequada \***  
*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

42. **O seu operador de rede anuncia de forma prévia e adequada situações de alteração do seu tarifário \***  
*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

43. **A relação preço-qualidade dos serviços prestados pelo seu operador de rede é adequada \***  
*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

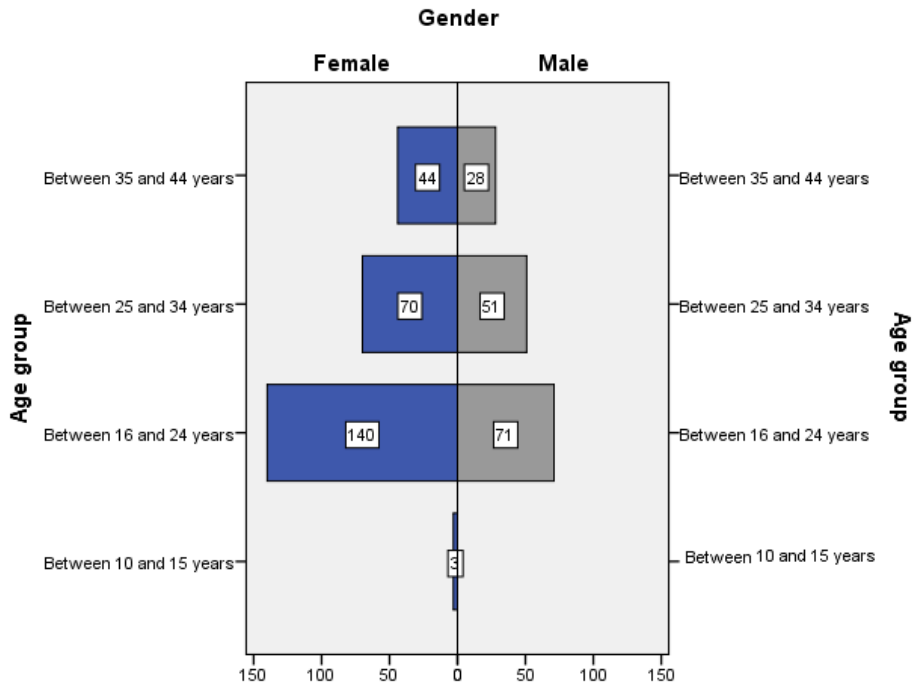
44. **As formas de pagamento disponibilizadas pelo seu operador de rede são adequadas \***  
*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

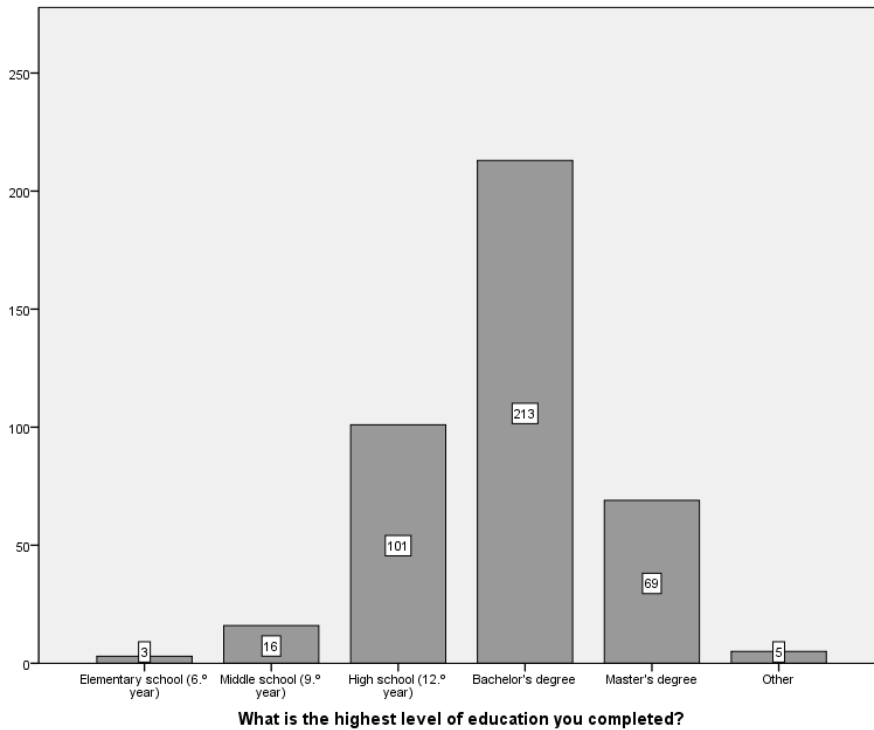
45. **Como classificaria, em termos globais, a qualidade dos serviços prestados pelo seu operador de rede \***  
*Marcar apenas uma oval.*

	1	2	3	4	5	6	7	
Muito fraca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Excelente

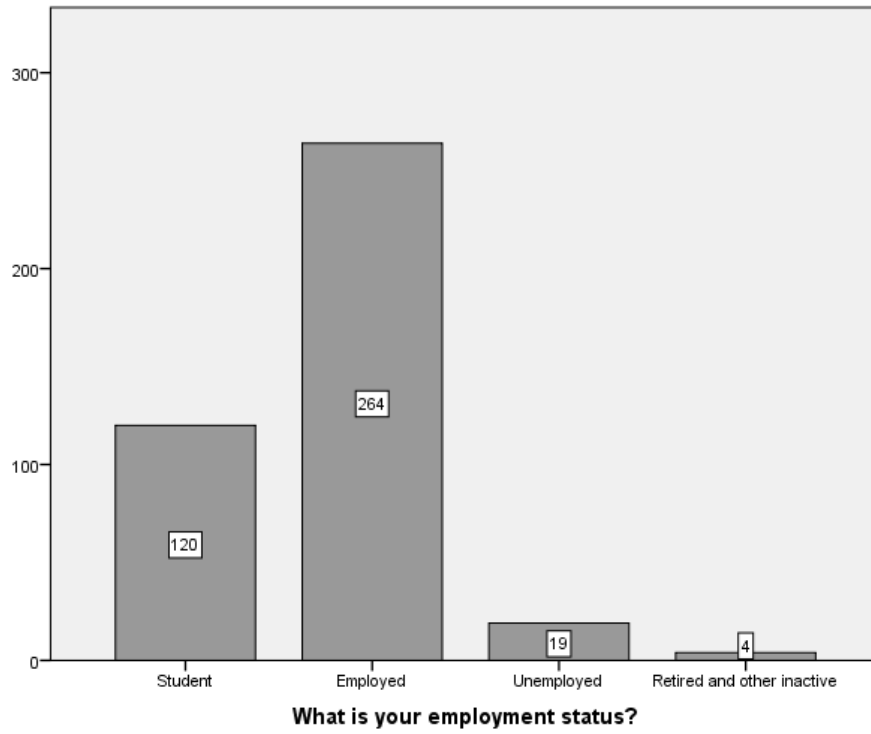
**Annex 3: Distribution of age groups in relation to each of the sexes**



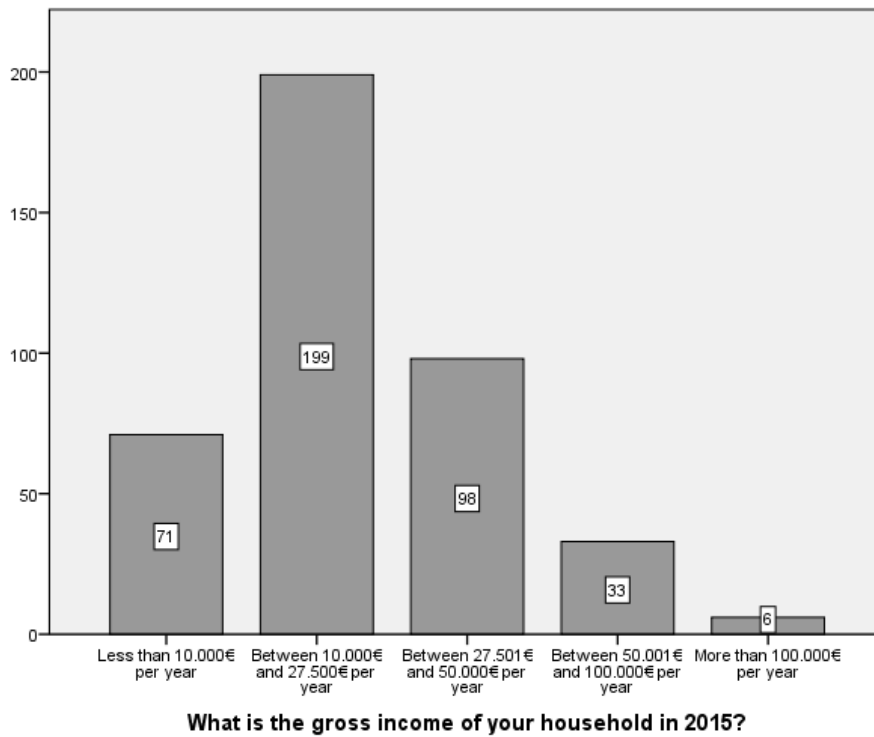
**Annex 4: Highest level of education completed by the respondents**



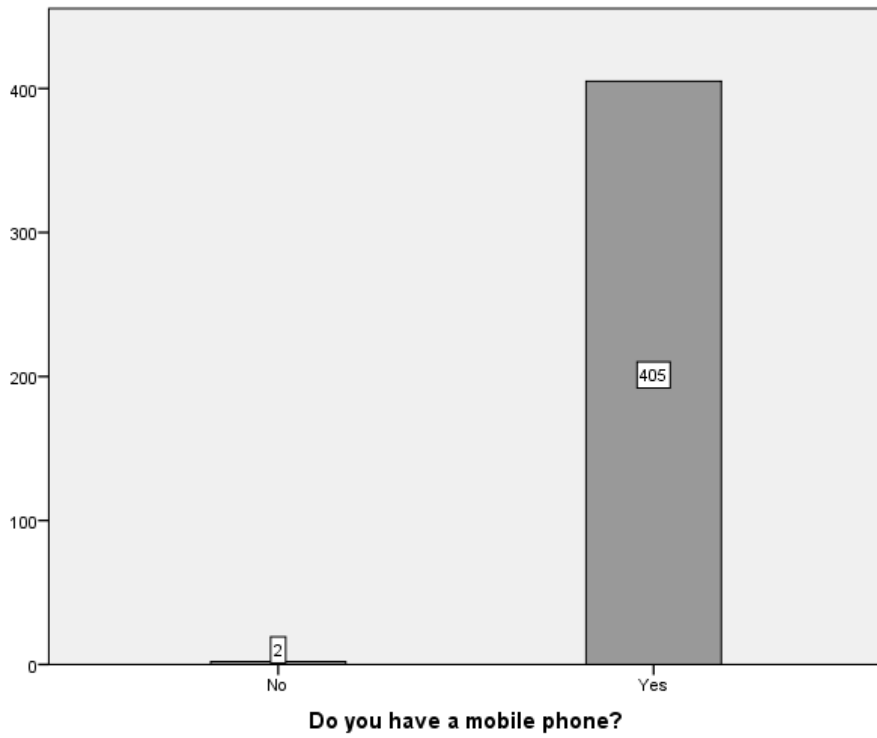
### Annex 5: Employment status of the respondents



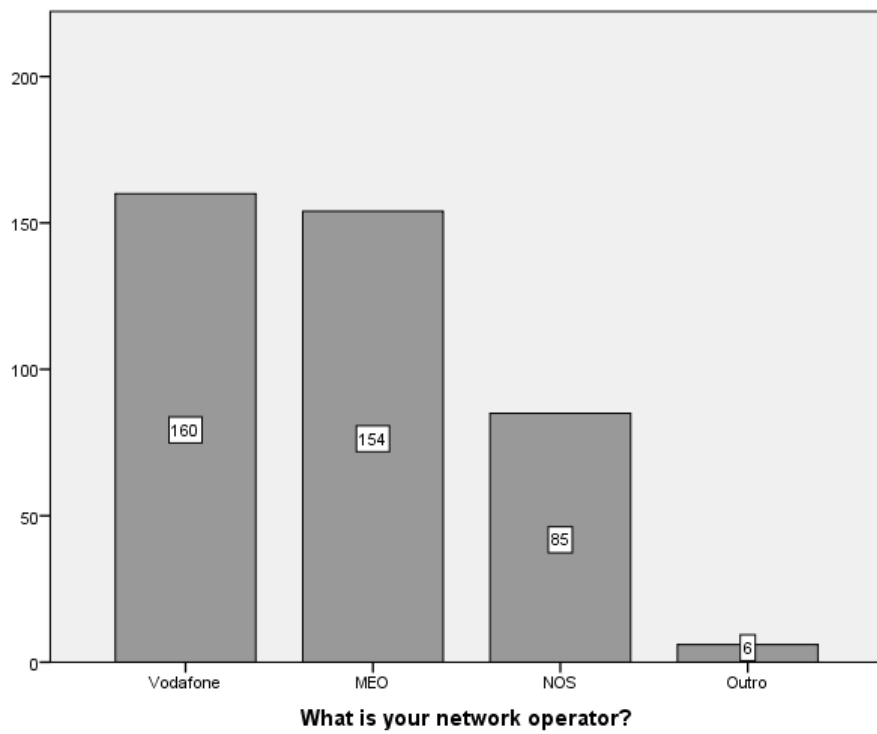
### Annex 6: Household income of respondents in 2015



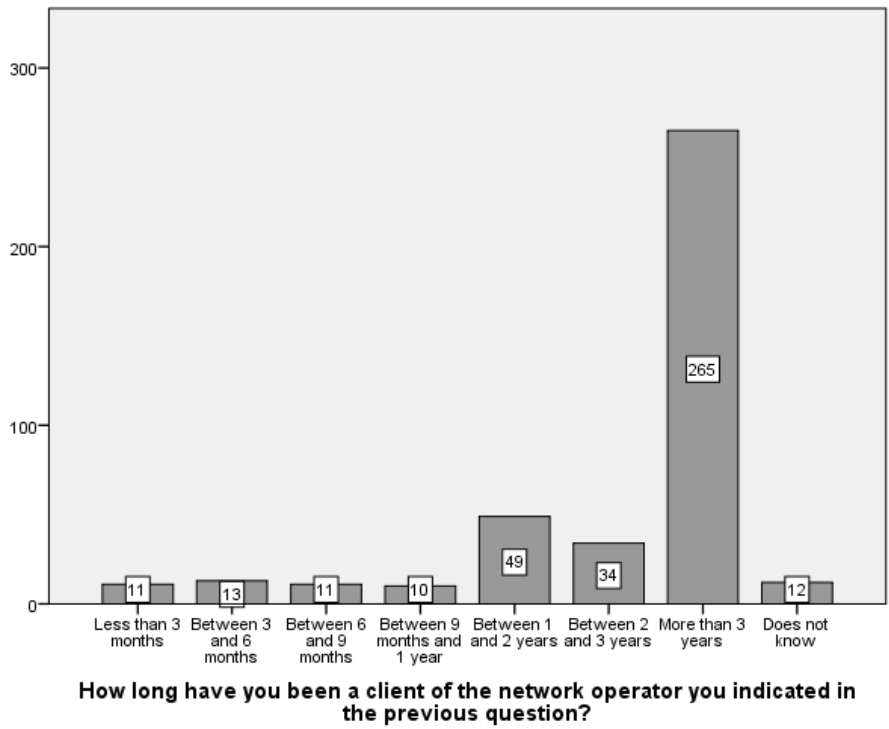
### Annex 7: Mobile phone ownership of the respondents



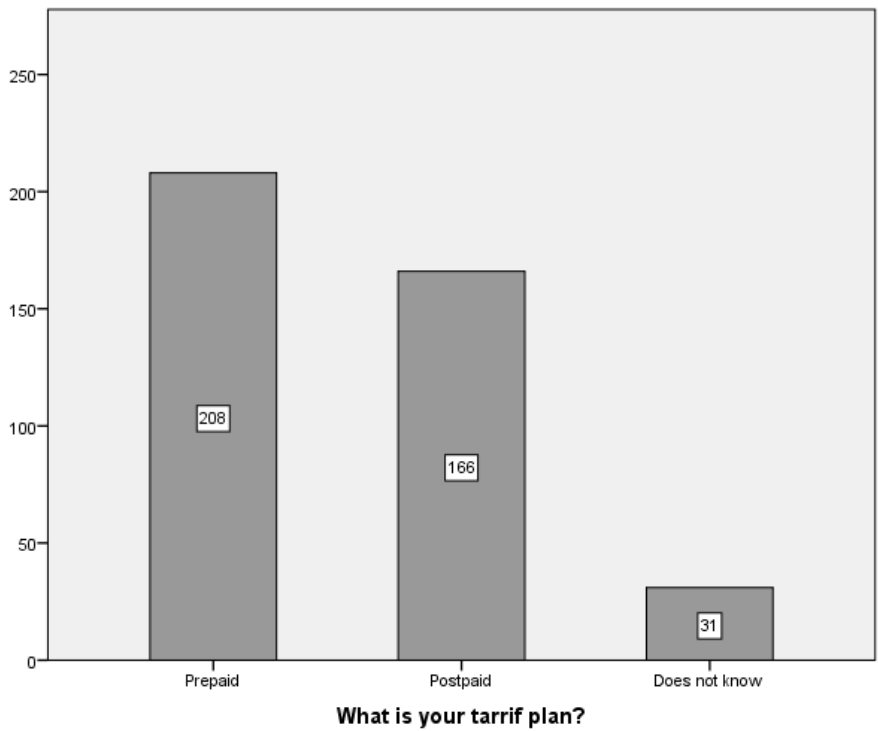
### Annex 8: Network operator of the respondents



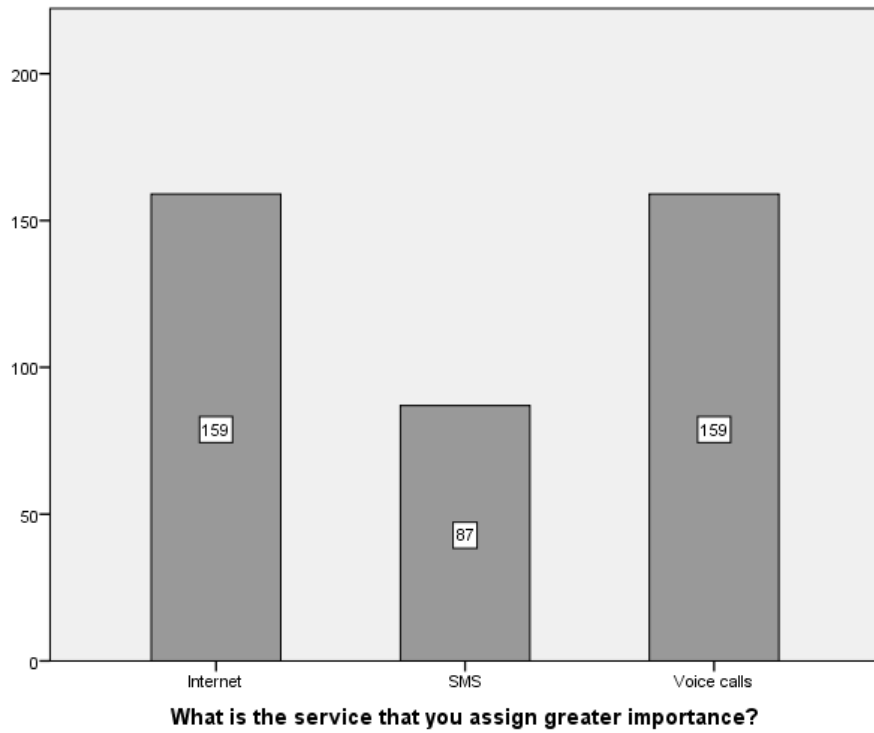
### Annex 9: Contract time regarding the services rendered by the respondent's network providers



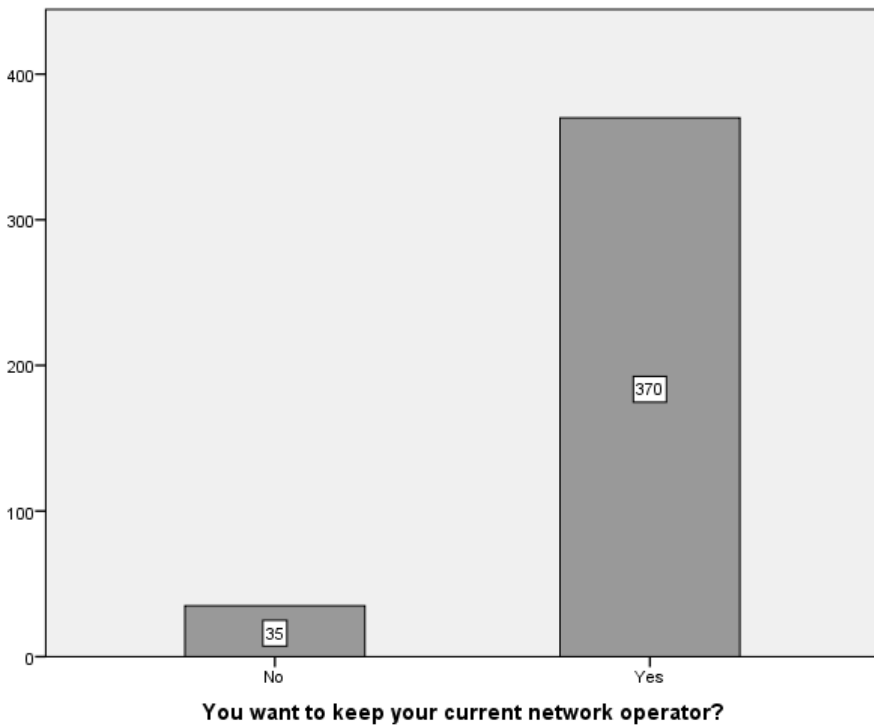
### Annex 10: Tariff Plan of the respondents



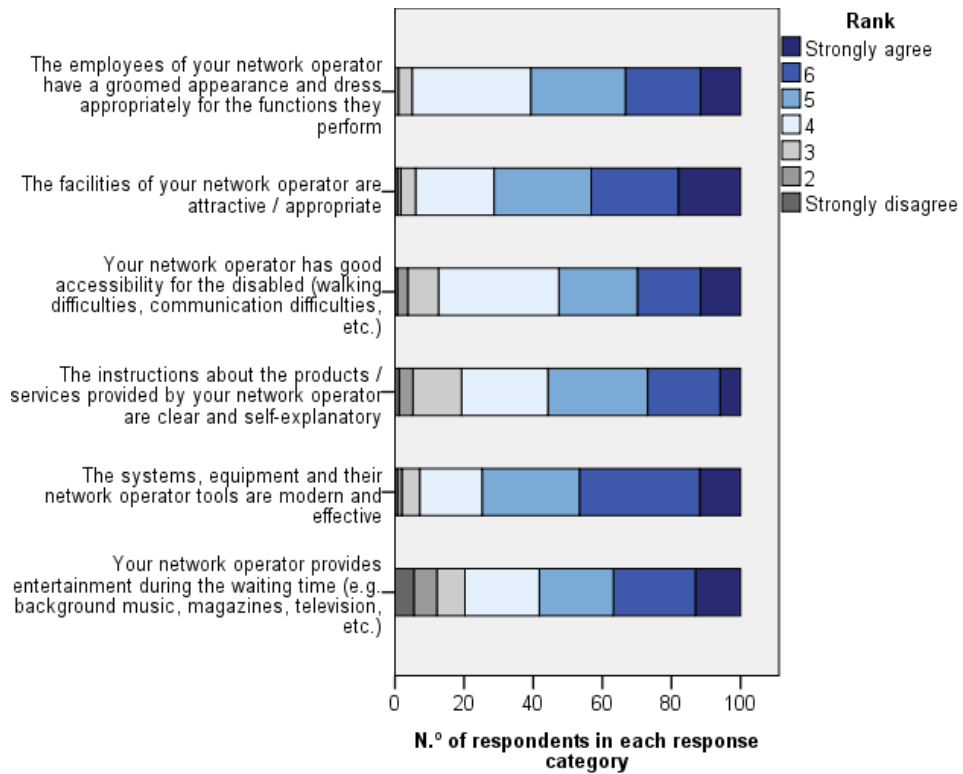
**Annex 11: Service with greater importance for the respondents**



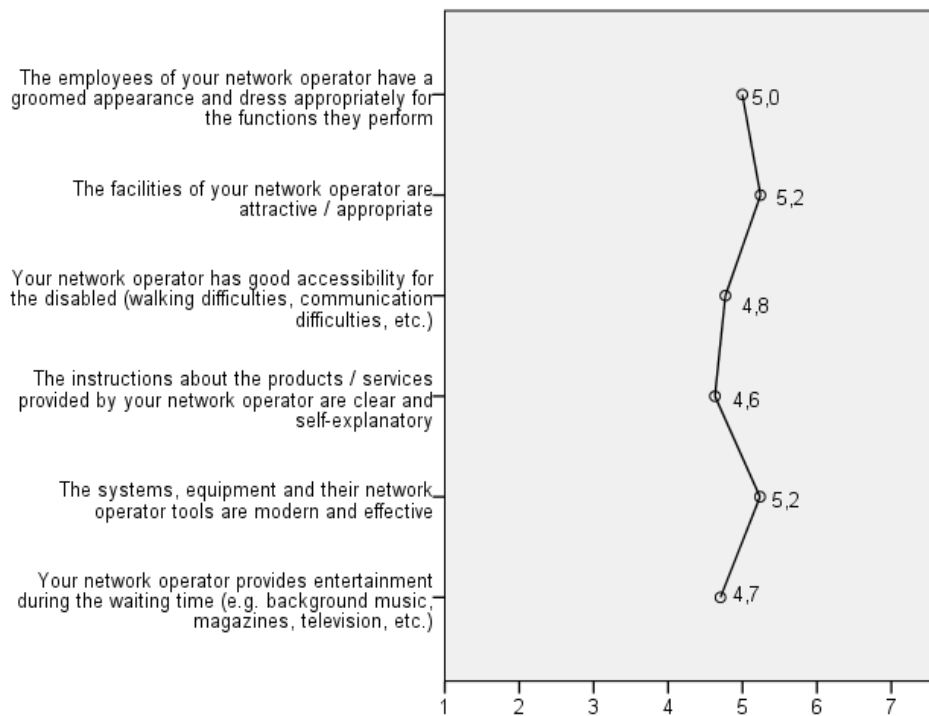
**Annex 12: Respondent's wish of remaining with the current network operator**



**Annex 13: Distribution of the frequency of items of the Tangibility dimension**

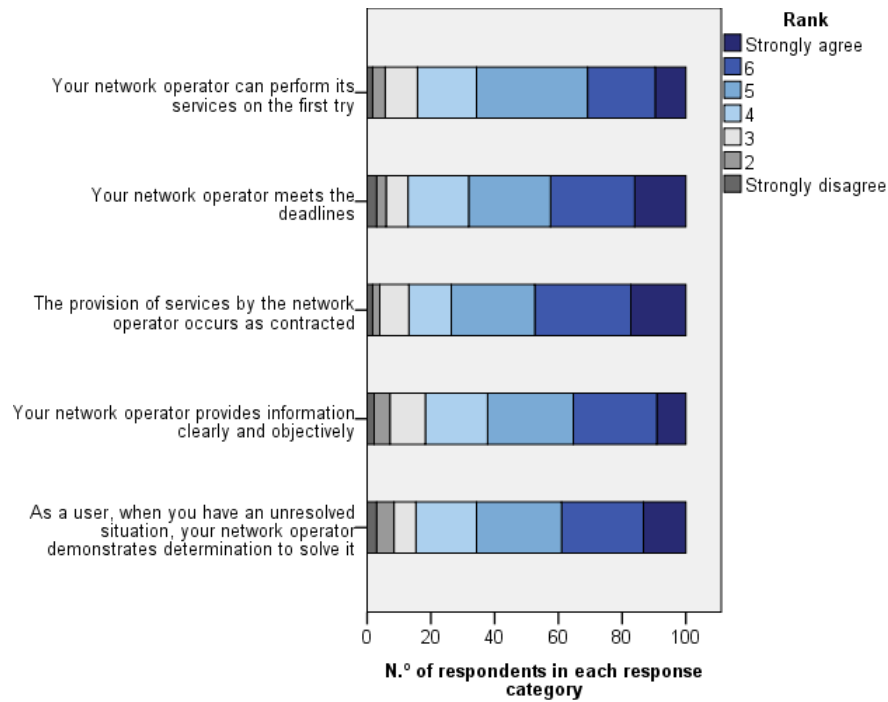


**Annex 14: Profile Averages of the items of the Tangibility dimension**

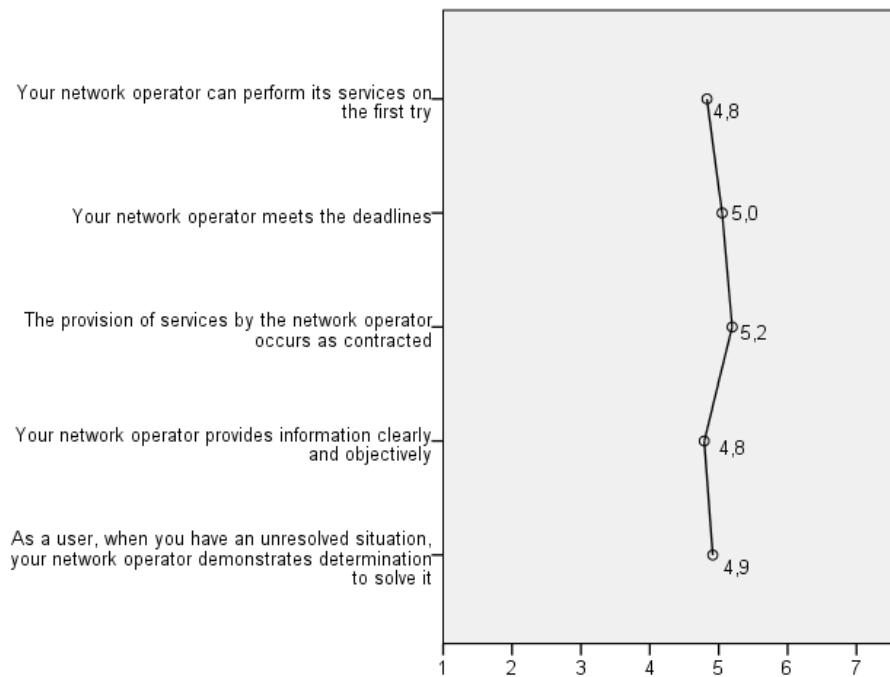




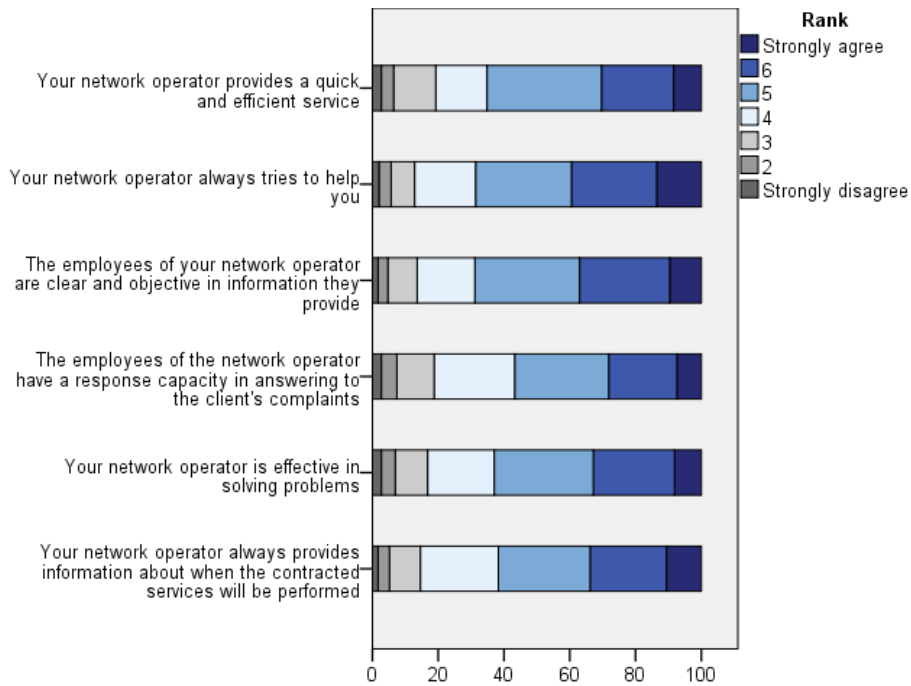
**Annex 15: Distribution of the frequency of items of the Assurance dimension**



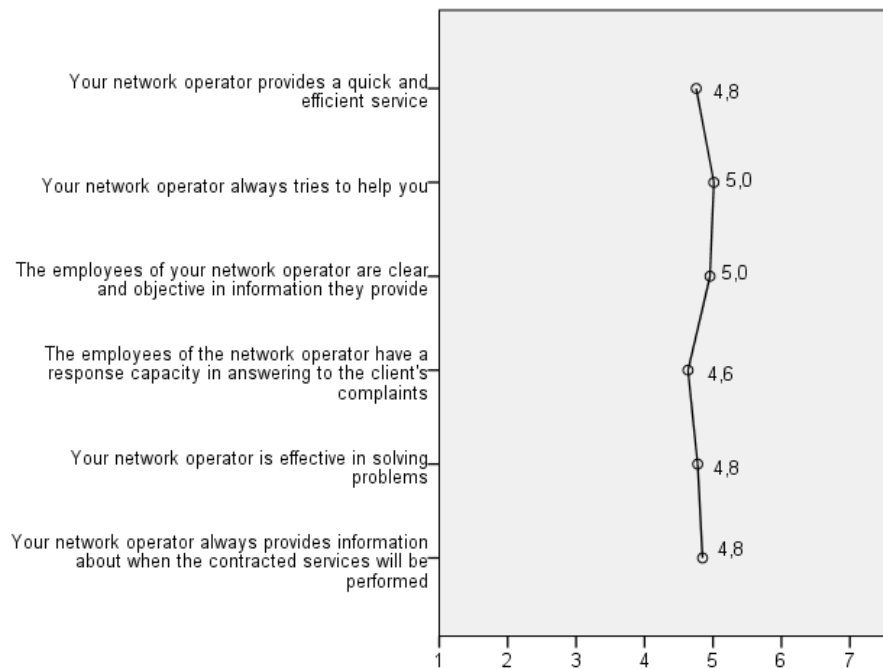
**Annex 16: Profile Averages of the items of the Assurance dimension**



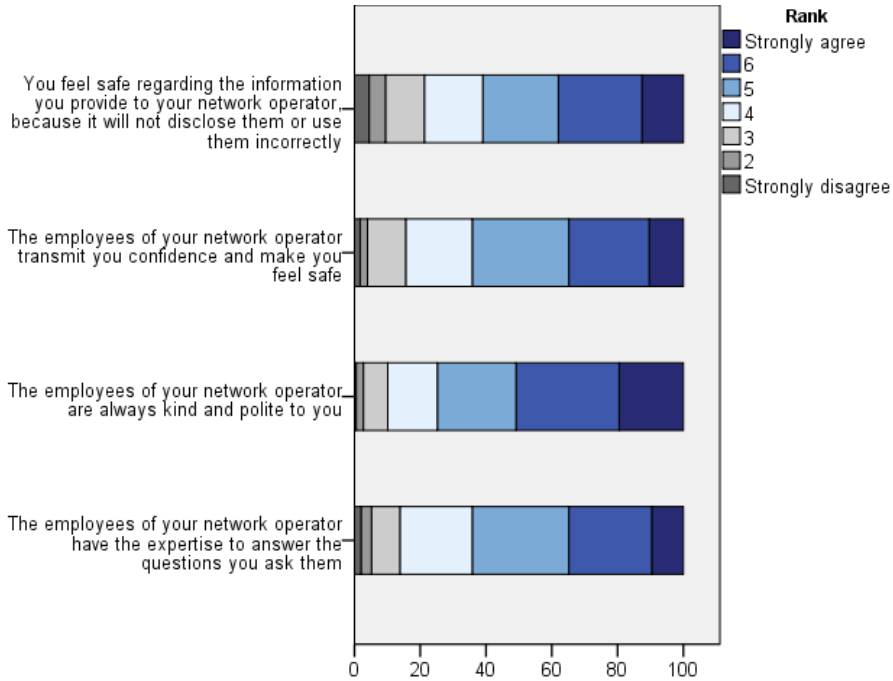
**Annex 17: Distribution of the frequency of items of the Responsiveness dimension**



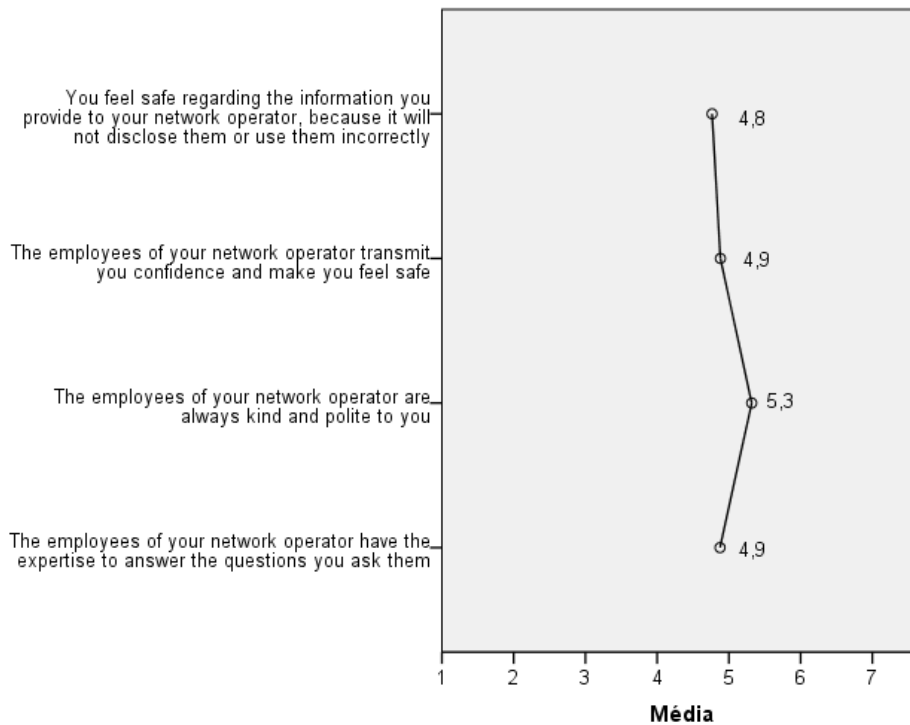
**Annex 18: Profile Averages of the items of the Responsiveness dimension**



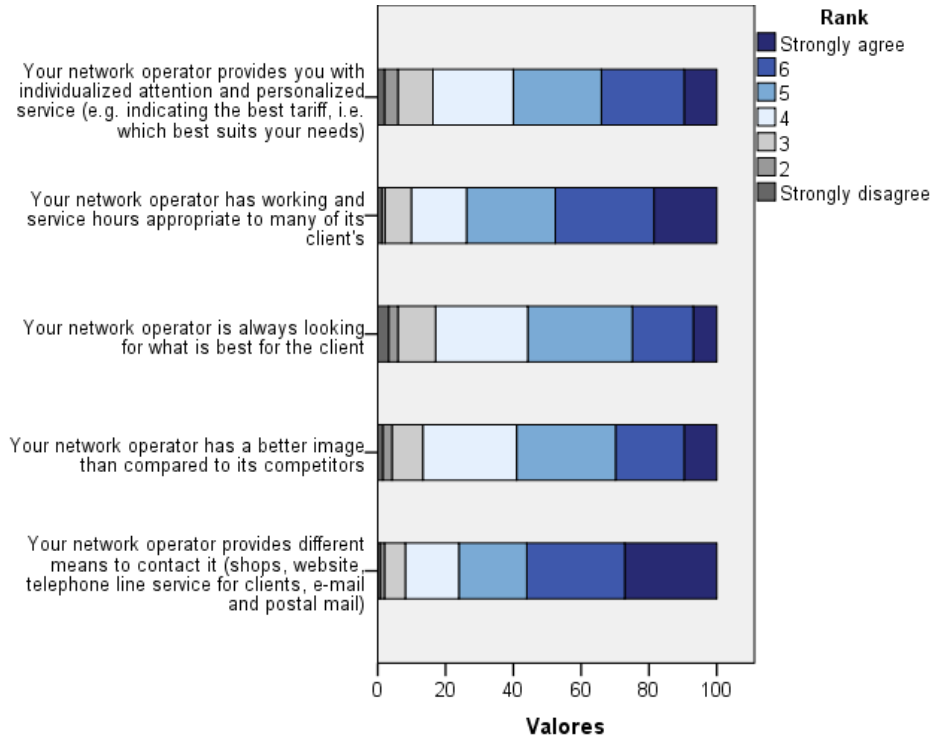
**Annex 19: Distribution of the frequency of items of the Reliability dimension**



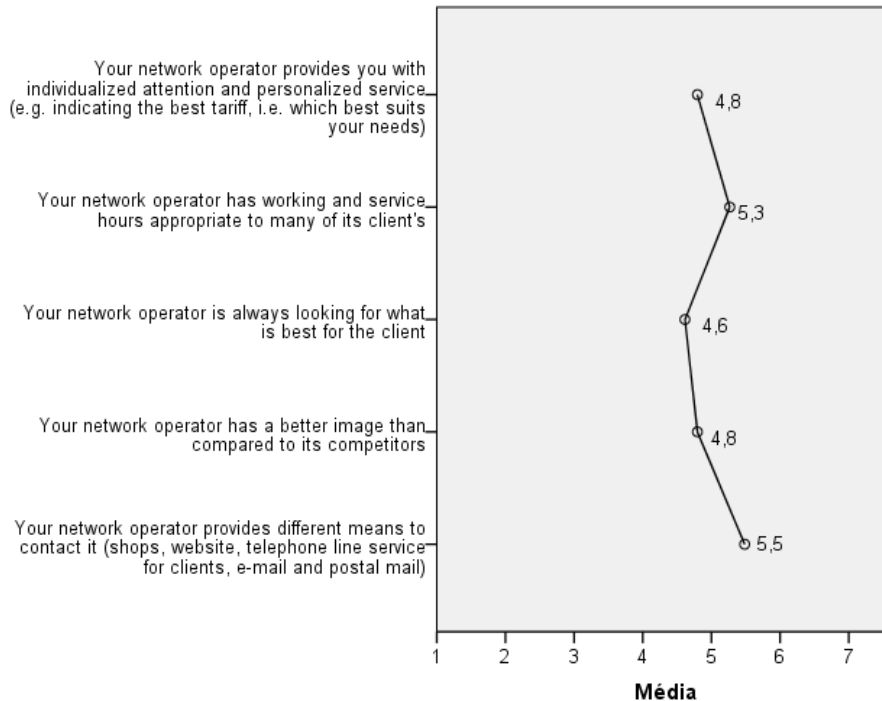
**Annex 20: Profile Averages of the items of the Reliability dimension**



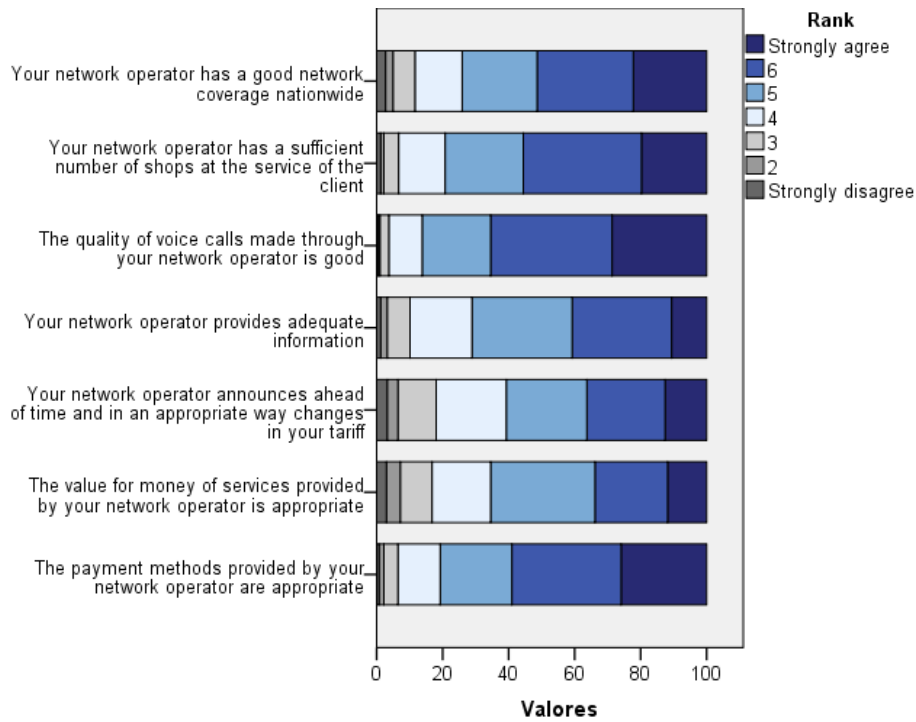
**Annex 21: Distribution of the frequency of items of the Empathy dimension**



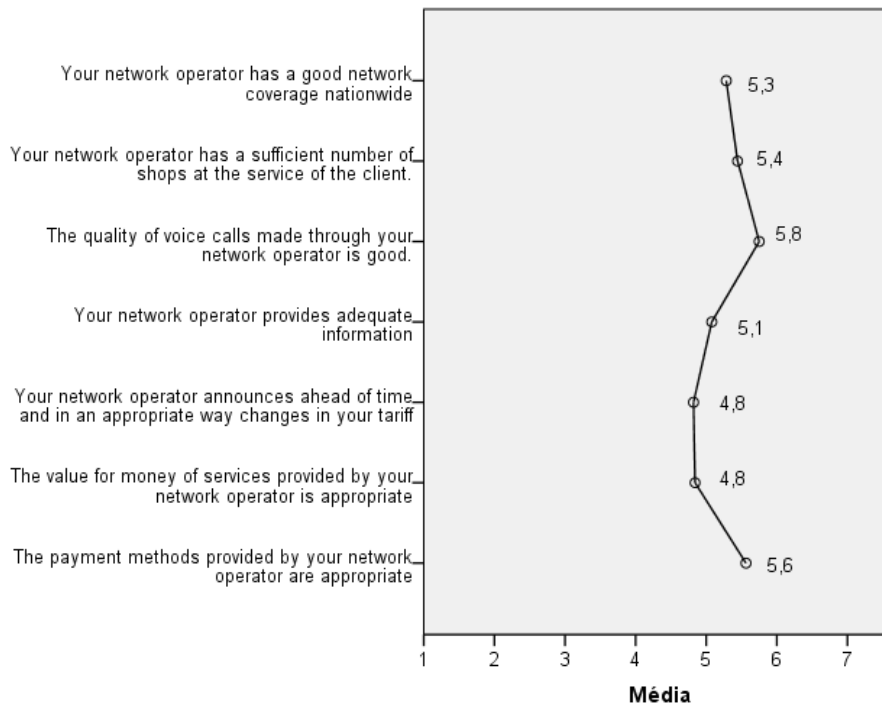
**Annex 22: Profile Averages of the items of the Empathy dimension**



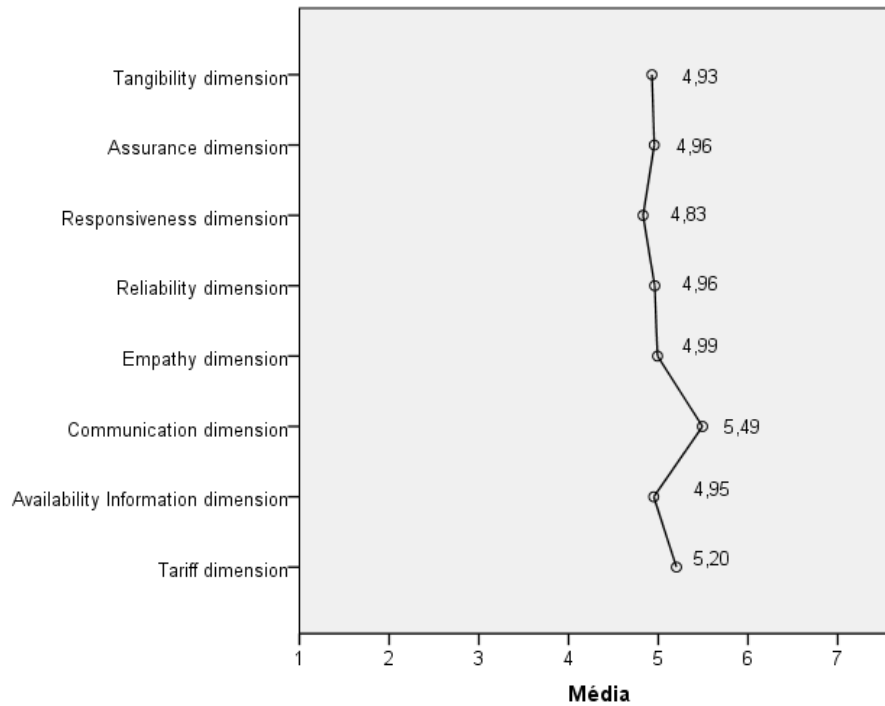
**Annex 23: Distribution of the frequency of items of the Communication, Availability Information and Tariff dimensions**



**Annex 24: Profile Averages of the items of the Communication, Availability Information and Tariff dimensions**



**Annex 25: Profile of averages in dimensions compared to the overall sample**



**Annex 26: Kolmogorov-Smirnov test to the Gender variable**

Testes de Normalidade							
	Gender	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Female	,061	255	,022	,988	255	,036
	Male	,082	150	,016	,984	150	,088
Assurance dimension	Female	,099	255	,000	,959	255	,000
	Male	,123	150	,000	,967	150	,001
Responsiveness dimension	Female	,107	255	,000	,955	255	,000
	Male	,072	150	,054	,983	150	,054
Reliability dimension	Female	,114	255	,000	,970	255	,000
	Male	,086	150	,009	,980	150	,029
Empathy dimension	Female	,096	255	,000	,969	255	,000
	Male	,082	150	,015	,980	150	,025
Communication dimension	Female	,129	255	,000	,924	255	,000
	Male	,120	150	,000	,947	150	,000
Availability Information dimension	Female	,152	255	,000	,952	255	,000
	Male	,122	150	,000	,963	150	,000
Tariff dimension	Female	,152	255	,000	,930	255	,000
	Male	,101	150	,001	,955	150	,000

a. Correlação de Significância de Lilliefors

**Annex 27: Kolmogorov-Smirnov test to the Age group variable**

Testes de Normalidade							
	Age range	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Between 10 and 24 years	,063	213	,040	,990	213	,156
	Between 25 and 34 years	,067	121	,002	,986	121	,242
	Between 35 e 44 years	,148	71	,001	,970	71	,089
Assurance dimension	Between 10 and 24 years	,098	213	,000	,964	213	,000
	Between 25 and 34 years	,133	121	,000	,953	121	,000
	Between 35 e 44 years	,107	71	,044	,967	71	,062
Responsiveness dimension	Between 10 and 24 years	,076	213	,004	,965	213	,000
	Between 25 and 34 years	,132	121	,000	,961	121	,001
	Between 35 e 44 years	,131	71	,004	,963	71	,037
Reliability dimension	Between 10 and 24 years	,089	213	,000	,974	213	,001
	Between 25 and 34 years	,100	121	,005	,967	121	,005
	Between 35 e 44 years	,154	71	,000	,962	71	,032
Empathy dimension	Between 10 and 24 years	,087	213	,000	,975	213	,001
	Between 25 and 34 years	,119	121	,000	,966	121	,004
	Between 35 e 44 years	,104	71	,056	,979	71	,294
Communication dimension	Between 10 and 24 years	,143	213	,000	,923	213	,000
	Between 25 and 34 years	,128	121	,000	,920	121	,000
	Between 35 e 44 years	,089	71	,200 <sup>c</sup>	,961	71	,025
Availability Information dimension	Between 10 and 24 years	,159	213	,000	,940	213	,000
	Between 25 and 34 years	,147	121	,000	,961	121	,001
	Between 35 e 44 years	,134	71	,003	,967	71	,060
Tariff dimension	Between 10 and 24 years	,155	213	,000	,934	213	,000
	Between 25 and 34 years	,139	121	,000	,929	121	,000
	Between 35 e 44 years	,106	71	,045	,963	71	,034

a. Correlação de Significância de Lilliefors

**Annex 28: Kolmogorov-Smirnov test to the Level of Education variable**

Testes de Normalidade							
	What is the highest level of education you completed?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Non-higher education	,077	120	,081	,984	120	,165
	Higher education	,061	285	,013	,989	285	,033
Assurance dimension	Non-higher education	,089	120	,021	,968	120	,005
	Higher education	,107	285	,000	,963	285	,000
Responsiveness dimension	Non-higher education	,088	120	,023	,969	120	,007
	Higher education	,101	285	,000	,967	285	,000
Reliability dimension	Non-higher education	,082	120	,048	,971	120	,012
	Higher education	,129	285	,000	,963	285	,000
Empathy dimension	Non-higher education	,078	120	,067	,978	120	,050
	Higher education	,081	285	,000	,971	285	,000
Communication dimension	Non-higher education	,104	120	,003	,939	120	,000
	Higher education	,131	285	,000	,930	285	,000
Availability Information dimension	Non-higher education	,119	120	,000	,964	120	,003
	Higher education	,150	285	,000	,949	285	,000
Tariff dimension	Non-higher education	,135	120	,000	,949	120	,000
	Higher education	,136	285	,000	,940	285	,000

a. Correlação de Significância de Lilliefors



**Annex 29: Kolmogorov-Smirnov test to the Employment Status variable**

Testes de Normalidade							
	What is your employment status?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Student	,086	119	,032	,983	119	,128
	Employed	,056	263	,041	,992	263	,175
	Without occupation	,110	23	,000	,966	23	,598
Assurance dimension	Student	,103	119	,003	,968	119	,006
	Employed	,116	263	,000	,958	263	,000
	Without occupation	,161	23	,126	,908	23	,037
Responsiveness dimension	Student	,104	119	,003	,971	119	,010
	Employed	,099	263	,000	,961	263	,000
	Without occupation	,118	23	,001	,927	23	,094
Reliability dimension	Student	,093	119	,013	,976	119	,032
	Employed	,123	263	,000	,970	263	,000
	Without occupation	,102	23	,002	,957	23	,411
Empathy dimension	Student	,092	119	,015	,985	119	,196
	Employed	,100	263	,000	,972	263	,000
	Without occupation	,103	23	,000	,965	23	,571
Communication dimension	Student	,149	119	,000	,932	119	,000
	Employed	,133	263	,000	,930	263	,000
	Without occupation	,134	23	,040	,932	23	,123
Availability Information dimension	Student	,134	119	,000	,955	119	,001
	Employed	,149	263	,000	,955	263	,000
	Without occupation	,178	23	,056	,933	23	,126
Tariff dimension	Student	,158	119	,000	,940	119	,000
	Employed	,139	263	,000	,942	263	,000
	Without occupation	,126	23	,030	,919	23	,062

a. Correlação de Significância de Lilliefors

**Annex 30: Kolmogorov-Smirnov test to the Gross household income in 2015 variable**

		Testes de Normalidade					
	What is the gross income of your household in 2015?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Less than 10.000€ per year	,084	71	,000	,981	71	,369
	Between 10.000€ and 27.500€ per year	,066	199	,034	,988	199	,086
	Between 27.501€ and 50.000€ per year	,097	96	,025	,983	96	,233
	More than 50.000€ per year	,111	39	,002	,969	39	,362
Assurance dimension	Less than 10.000€ per year	,140	71	,001	,946	71	,004
	Between 10.000€ and 27.500€ per year	,104	199	,000	,959	199	,000
	Between 27.501€ and 50.000€ per year	,093	96	,039	,960	96	,005
	More than 50.000€ per year	,181	39	,002	,938	39	,033
Responsiveness dimension	Less than 10.000€ per year	,105	71	,049	,935	71	,001
	Between 10.000€ and 27.500€ per year	,075	199	,008	,974	199	,001
	Between 27.501€ and 50.000€ per year	,111	96	,005	,957	96	,003
	More than 50.000€ per year	,101	39	,000	,948	39	,069
Reliability dimension	Less than 10.000€ per year	,096	71	,100	,949	71	,006
	Between 10.000€ and 27.500€ per year	,104	199	,000	,977	199	,002
	Between 27.501€ and 50.000€ per year	,121	96	,001	,961	96	,006
	More than 50.000€ per year	,132	39	,085	,942	39	,045
Empathy dimension	Less than 10.000€ per year	,077	71	,010	,976	71	,196
	Between 10.000€ and 27.500€ per year	,099	199	,000	,968	199	,000
	Between 27.501€ and 50.000€ per year	,089	96	,059	,958	96	,004
	More than 50.000€ per year	,122	39	,151	,951	39	,089
Communication dimension	Less than 10.000€ per year	,140	71	,001	,930	71	,001
	Between 10.000€ and 27.500€ per year	,135	199	,000	,929	199	,000
	Between 27.501€ and 50.000€ per year	,109	96	,007	,940	96	,000
	More than 50.000€ per year						

## Assessment of the Quality of Mobile Telecommunications Services

	More than 50.000€ per year	,238	39	,000	,863	39	,000
Availability Information dimension	Less than 10.000€ per year	,143	71	,001	,947	71	,005
	Between 10.000€ and 27.500€ per year	,151	199	,000	,946	199	,000
	Between 27.501€ and 50.000€ per year	,141	96	,000	,967	96	,017
	More than 50.000€ per year	,143	39	,044	,931	39	,019
Tariff dimension	Less than 10.000€ per year	,162	71	,000	,908	71	,000
	Between 10.000€ and 27.500€ per year	,132	199	,000	,951	199	,000
	Between 27.501€ and 50.000€ per year	,156	96	,000	,942	96	,000
	More than 50.000€ per year	,189	39	,001	,928	39	,016

\*. Este é um limite inferior da significância verdadeira.

a. Correlação de Significância de Lilliefors

**Annex 31: Kolmogorov-Smirnov test to the Network operator variable**

Testes de Normalidade							
	What is your network operator?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	MEO	,068	154	,080	,992	154	,585
	NOS	,097	85	,045	,981	85	,239
	Vodafone	,074	160	,034	,984	160	,061
	Other	,256	6	,000	,952	6	,755
Assurance dimension	MEO	,107	154	,000	,968	154	,001
	NOS	,120	85	,004	,965	85	,021
	Vodafone	,099	160	,001	,963	160	,000
	Other	,293	6	,117	,915	6	,473
Responsiveness dimension	MEO	,097	154	,001	,973	154	,004
	NOS	,090	85	,083	,972	85	,057
	Vodafone	,096	160	,001	,961	160	,000
	Other	,241	6	,012	,902	6	,387
Reliability dimension	MEO	,108	154	,000	,982	154	,040
	NOS	,104	85	,023	,960	85	,010
	Vodafone	,093	160	,002	,978	160	,011
	Other	,222	6	,001	,868	6	,219
Empathy dimension	MEO	,086	154	,007	,978	154	,013
	NOS	,098	85	,043	,957	85	,006
	Vodafone	,080	160	,015	,977	160	,010
	Other	,190	6	,000	,923	6	,530
Communication dimension	MEO	,098	154	,001	,952	154	,000
	NOS	,158	85	,000	,933	85	,000
	Vodafone	,142	160	,000	,898	160	,000
	Other	,234	6	,000	,862	6	,197
Availability Information dimension	MEO	,153	154	,000	,966	154	,001
	NOS	,105	85	,021	,943	85	,001
	Vodafone	,173	160	,000	,930	160	,000
	Other	,262	6	,010	,862	6	,195
Tariff dimension	MEO	,130	154	,000	,963	154	,000
	NOS	,151	85	,000	,933	85	,000
	Vodafone	,165	160	,000	,923	160	,000
	Other	,492	6	,000	,496	6	,000

a. Correlação de Significância de Lilliefors

**Annex 32: Kolmogorov-Smirnov test to the Contract time variable**

Testes de Normalidade							
	How long have you been a client of the network operator you indicated in the previous question?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Less than 1 year	,084	45	,000	,969	45	,263
	Between 1 and 2 years	,131	49	,035	,959	49	,085
	Between 2 and 3 years	,181	34	,006	,975	34	,598
	More than 3 years	,066	265	,007	,986	265	,012
	Does not know	,164	12	,001	,873	12	,071
Assurance dimension	Less than 1 year	,131	45	,052	,950	45	,053
	Between 1 and 2 years	,104	49	,002	,957	49	,074
	Between 2 and 3 years	,092	34	,010	,965	34	,344
	More than 3 years	,110	265	,000	,967	265	,000
	Does not know	,155	12	,012	,939	12	,484
Responsiveness dimension	Less than 1 year	,128	45	,062	,936	45	,015
	Between 1 and 2 years	,113	49	,161	,975	49	,391
	Between 2 and 3 years	,128	34	,172	,950	34	,123
	More than 3 years	,079	265	,000	,970	265	,000
	Does not know	,277	12	,011	,899	12	,155
Reliability dimension	Less than 1 year	,139	45	,029	,937	45	,017
	Between 1 and 2 years	,109	49	,198	,972	49	,285
	Between 2 and 3 years	,110	34	,000	,956	34	,188
	More than 3 years	,094	265	,000	,978	265	,000
	Does not know	,165	12	,023	,945	12	,567
Empathy dimension	Less than 1 year	,112	45	,194	,954	45	,072
	Between 1 and 2 years	,120	49	,077	,968	49	,197
	Between 2 and 3 years	,110	34	,001	,971	34	,498
	More than 3 years	,082	265	,000	,976	265	,000
	Does not know	,234	12	,068	,813	12	,013
Communication dimension	Less than 1 year	,116	45	,158	,945	45	,032
	Between 1 and 2 years	,146	49	,010	,952	49	,046
	Between 2 and 3 years	,152	34	,046	,930	34	,032
	More than 3 years	,140	265	,000	,916	265	,000
	Does not know	,142	12	,004	,932	12	,404
Availability Information dimension	Less than 1 year	,132	45	,049	,931	45	,010
	Between 1 and 2 years	,151	49	,007	,957	49	,073
	Between 2 and 3 years	,139	34	,093	,945	34	,084
	More than 3 years	,162	265	,000	,952	265	,000

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	Does not know	,179	12	,003	,929	12	,369
Tariff dimension	Less than 1 year	,148	45	,015	,928	45	,008
	Between 1 and 2 years	,116	49	,094	,967	49	,179
	Between 2 and 3 years	,132	34	,141	,946	34	,092
	More than 3 years	,144	265	,000	,940	265	,000
	Does not know	,215	12	,131	,908	12	,202

a. Correlação de Significância de Lilliefors

### Annex 33: Kolmogorov-Smirnov test to the Tariff plan variable

		Testes de Normalidade					
		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
What is your tariff plan?		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Prepaid	,067	208	,022	,986	208	,040
	Postpays	,062	166	,000	,991	166	,420
	Does not know	,132	31	,183	,948	31	,135
Assurance dimension	Prepaid	,113	208	,000	,966	208	,000
	Postpays	,105	166	,000	,954	166	,000
	Does not know	,078	31	,001	,964	31	,380
Responsiveness dimension	Prepaid	,087	208	,001	,966	208	,000
	Postpays	,080	166	,011	,969	166	,001
	Does not know	,148	31	,082	,949	31	,151
Reliability dimension	Prepaid	,110	208	,000	,972	208	,000
	Postpays	,111	166	,000	,973	166	,002
	Does not know	,132	31	,179	,938	31	,073
Empathy dimension	Prepaid	,081	208	,002	,979	208	,003
	Postpays	,097	166	,001	,965	166	,000
	Does not know	,108	31	,000	,960	31	,293
Communication dimension	Prepaid	,140	208	,000	,929	208	,000
	Postpays	,125	166	,000	,920	166	,000
	Does not know	,134	31	,165	,929	31	,040
Availability Information dimension	Prepaid	,151	208	,000	,953	208	,000
	Postpays	,139	166	,000	,954	166	,000
	Does not know	,213	31	,001	,905	31	,010
Tariff dimension	Prepaid	,152	208	,000	,933	208	,000
	Postpays	,138	166	,000	,946	166	,000
	Does not know	,159	31	,044	,934	31	,056

a. Correlação de Significância de Lilliefors

**Annex 34: Kolmogorov-Smirnov test to the Service with greater importance variable**

Testes de Normalidade							
	What is the service that you assign greater importance?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Voice calls	,085	159	,007	,988	159	,204
	MMS	,062	87	,000	,986	87	,448
	Internet	,056	159	,001	,987	159	,128
Assurance dimension	Voice calls	,116	159	,000	,966	159	,001
	MMS	,083	87	,194	,974	87	,079
	Internet	,143	159	,000	,945	159	,000
Responsiveness dimension	Voice calls	,125	159	,000	,954	159	,000
	MMS	,092	87	,065	,961	87	,010
	Internet	,070	159	,052	,977	159	,010
Reliability dimension	Voice calls	,105	159	,000	,975	159	,005
	MMS	,096	87	,046	,977	87	,119
	Internet	,115	159	,000	,969	159	,001
Empathy dimension	Voice calls	,069	159	,065	,984	159	,069
	MMS	,106	87	,017	,951	87	,003
	Internet	,094	159	,002	,969	159	,001
Communication dimension	Voice calls	,091	159	,003	,960	159	,000
	MMS	,122	87	,003	,929	87	,000
	Internet	,160	159	,000	,904	159	,000
Availability Information dimension	Voice calls	,122	159	,000	,958	159	,000
	MMS	,132	87	,001	,957	87	,006
	Internet	,165	159	,000	,950	159	,000
Tariff dimension	Voice calls	,123	159	,000	,957	159	,000
	MMS	,147	87	,000	,945	87	,001
	Internet	,160	159	,000	,929	159	,000

a. Correlação de Significância de Lilliefors

**Annex 35: Kolmogorov-Smirnov test to the Service with greater importance variable**

Testes de Normalidade							
	You want to keep your current network operator?	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Estatística	gl	Sig.	Estatística	gl	Sig.
Tangibility dimension	Yes	,053	370	,014	,991	370	,028
	No	,088	35	,000	,977	35	,651
Assurance dimension	Yes	,096	370	,000	,967	370	,000
	No	,148	35	,051	,944	35	,074
Responsiveness dimension	Yes	,077	370	,000	,970	370	,000
	No	,094	35	,001	,978	35	,685
Reliability dimension	Yes	,100	370	,000	,975	370	,000
	No	,128	35	,157	,969	35	,429
Empathy dimension	Yes	,073	370	,000	,983	370	,000
	No	,117	35	,002	,972	35	,511
Communication dimension	Yes	,115	370	,000	,941	370	,000
	No	,168	35	,013	,915	35	,010
Availability Information dimension	Yes	,135	370	,000	,961	370	,000
	No	,107	35	,001	,967	35	,375
Tariff dimension	Yes	,128	370	,000	,946	370	,000
	No	,118	35	,030	,969	35	,414

a. Correlação de Significância de Lilliefors

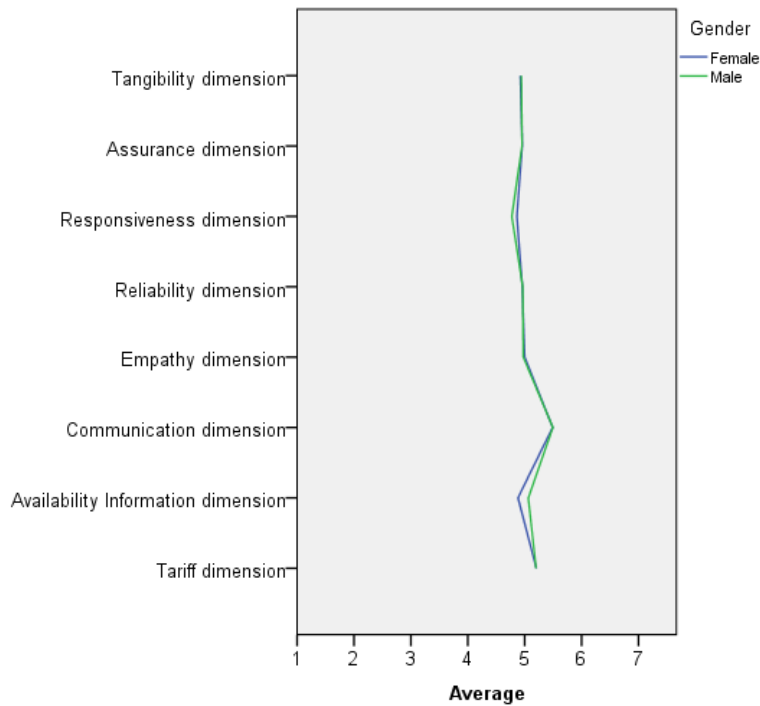


**Annex 36: Hypothesis test to the equality of two populational distributions of the Gender variable**

Test Statistics <sup>a</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Mann-Whitney U	18915,500	18594,500	17590,000	18749,000	18064,500	18852,000	18181,000	18380,500
Wilcoxon W	30240,500	29919,500	28915,000	30074,000	29389,500	30177,000	50821,000	29705,500
Z	-,184	-,467	-1,351	-,331	-,934	-,241	-,838	-,661
Asymp. Sig. (2-tailed)	,854	,640	,177	,740	,350	,809	,402	,508

a. Grouping Variable: Gender

**Annex 37: Profile of averages of dimensions against Gender**



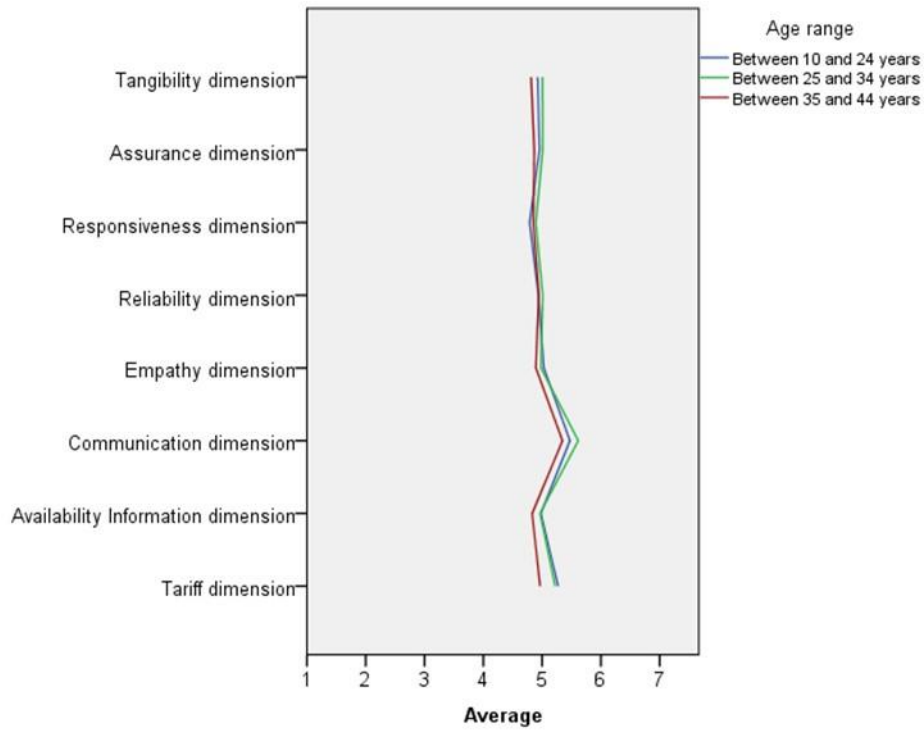
**Annex 38: Hypothesis test to the equality of several populational distributions of the Age group variable**

Test Statistics <sup>a,b</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	3,169	,746	,596	,440	1,924	3,343	2,171	6,720
df	2	2	2	2	2	2	2	2
Asymp. Sig.	,205	,689	,742	,803	,382	,188	,338	,035

a. Kruskal Wallis Test

b. Grouping Variable: Age range

**Annex 39: Profile of averages of dimensions against Age Group**

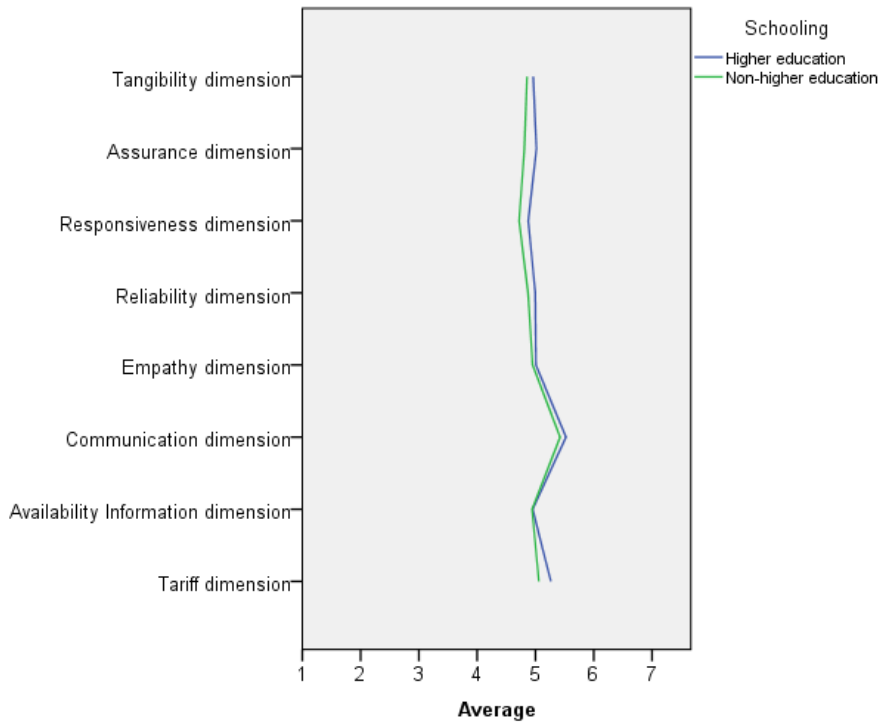


**Annex 40: Hypothesis test to the equality of two populational distributions of the Level of Education variable**

Test Statistics <sup>a</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Mann-Whitney U	15667,000	15833,000	16110,500	15783,000	16516,500	16320,500	16837,500	15778,500
Wilcoxon W	22927,000	23093,000	23370,500	23043,000	23776,500	23580,500	24097,500	23038,500
Z	-1,334	-1,180	-,921	-1,227	-,544	-,729	-,246	-1,241
Asymp. Sig. (2-tailed)	,182	,238	,357	,220	,587	,466	,805	,215

a. Grouping Variable: What is the highest level of education you completed?

**Annex 41: Profile of averages of dimensions against the Level of Education**



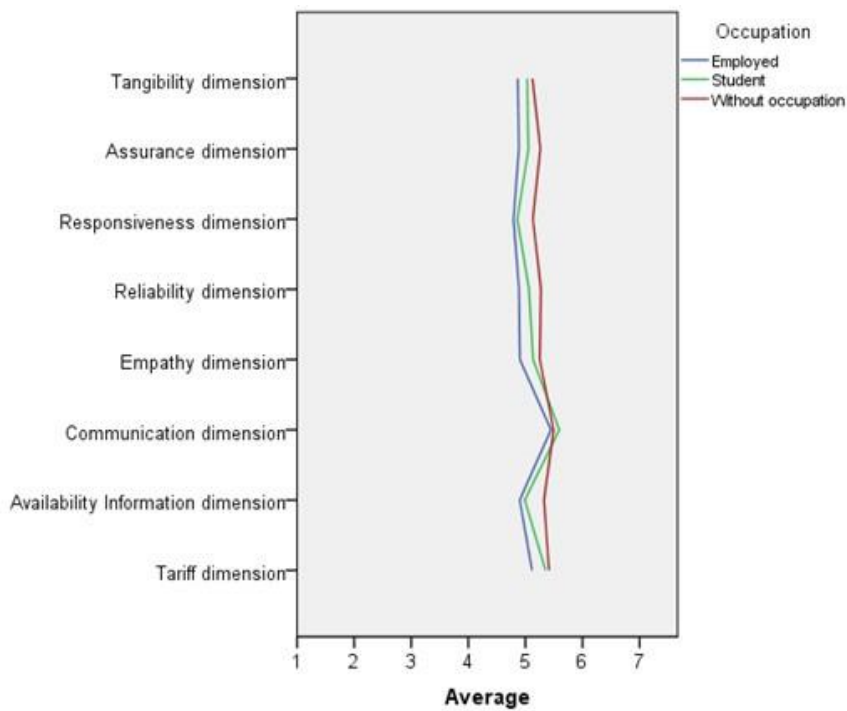
**Annex 42: Hypothesis test to the equality of two populational distributions of the Employment Status variable**

Test Statistics <sup>a,b</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	3,383	3,749	2,300	2,873	4,693	1,667	2,715	3,337
df	2	2	2	2	2	2	2	2
Asymp. Sig.	,184	,153	,317	,238	,096	,434	,257	,189

a. Kruskal Wallis Test

b. Grouping Variable: What is your employment status?

**Annex 43: Profile of averages of dimensions against the Employment Status**



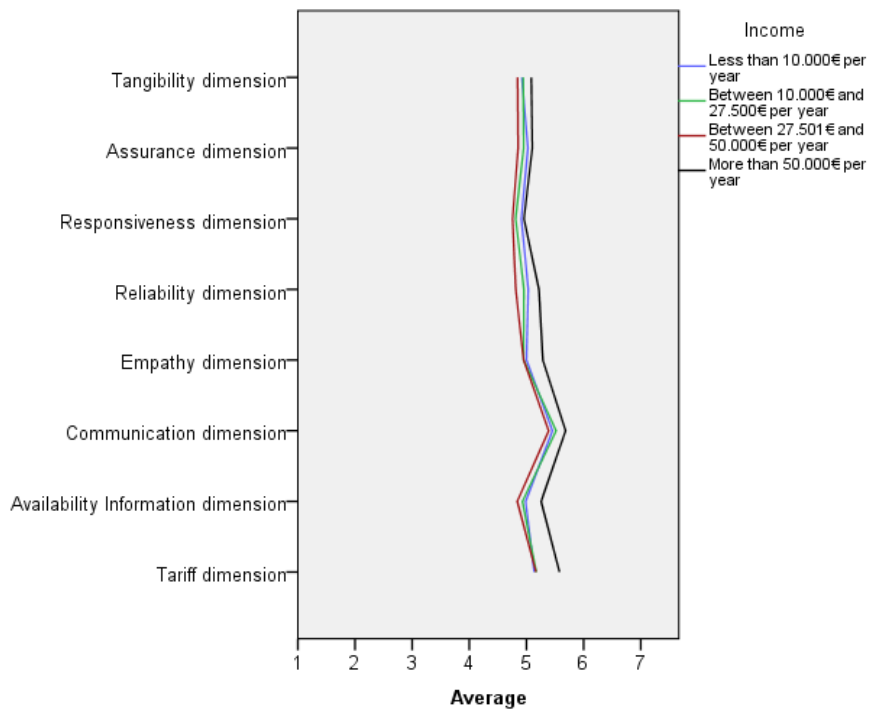
**Annex 44: Hypothesis test to the equality of several populational distributions of the Gross household income in 2015 variable**

Test Statistics <sup>a,b</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	1,844	2,212	1,545	4,534	2,665	3,526	4,013	4,434
df	3	3	3	3	3	3	3	3
Asymp. Sig.	,605	,530	,672	,209	,446	,317	,260	,218

a. Kruskal Wallis Test

b. Grouping Variable: What is the gross income of your household in 2015?

**Annex 45: Profile of averages of dimensions against the gross income of the household in 2015**



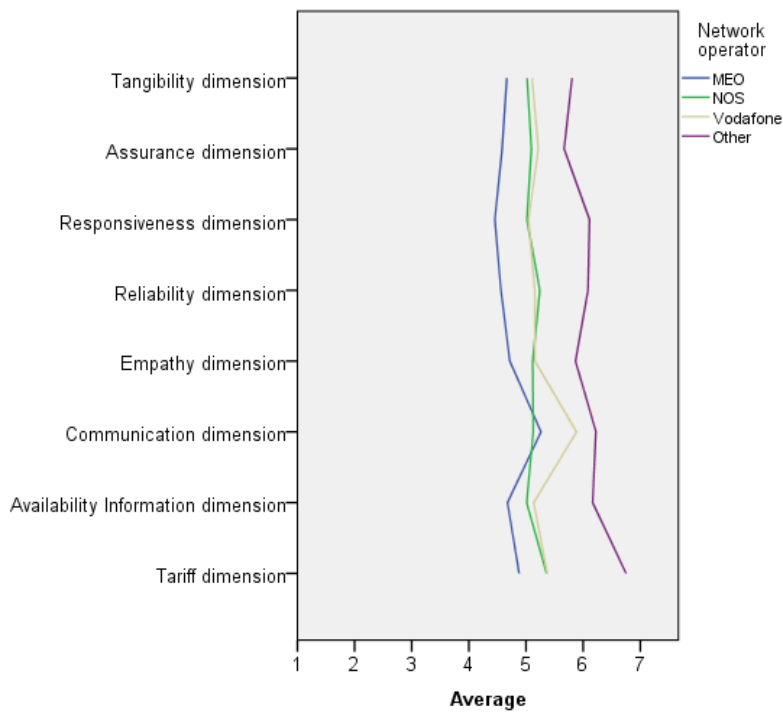
**Annex 46: Hypothesis test to the equality of several populational distributions of the Network operator variable**

	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	23,015	23,318	26,449	30,641	20,755	42,915	18,446	27,880
df	3	3	3	3	3	3	3	3
Asymp. Sig.	,000	,000	,000	,000	,000	,000	,000	,000

a. Kruskal Wallis Test

b. Grouping Variable: What is your network operator?

**Annex 47: Profile of averages of dimensions against the network operator**



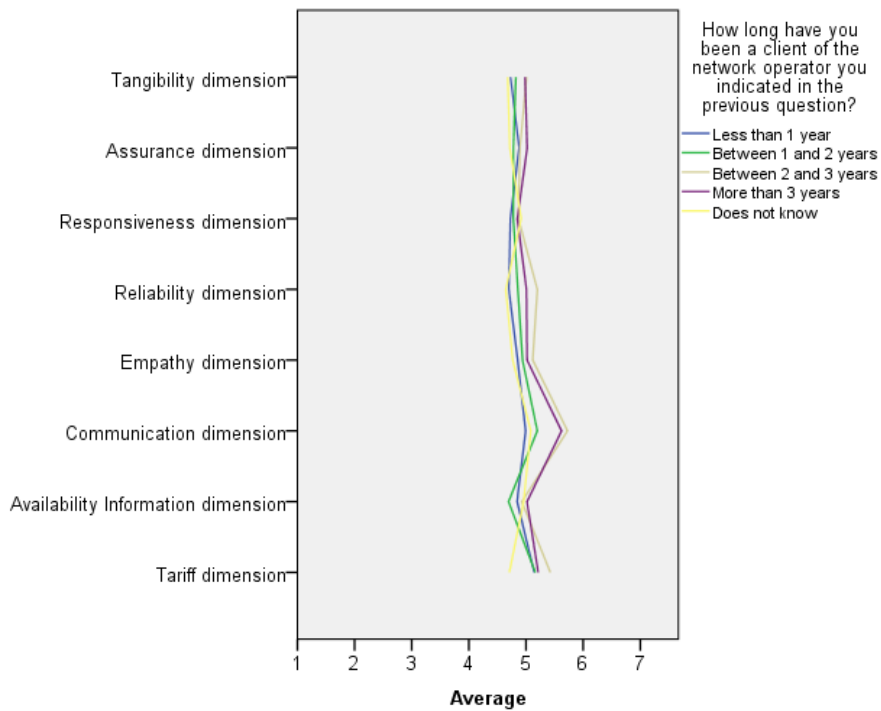
**Annex 48: Hypothesis test to the equality of several populational distributions of the Contract time variable**

Test Statistics <sup>a,b</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	4,519	2,039	,535	2,843	3,249	19,812	4,516	3,320
df	4	4	4	4	4	4	4	4
Asymp. Sig.	,340	,729	,970	,584	,517	,001	,341	,506

a. Kruskal Wallis Test

b. Grouping Variable: How long have you been a client of the network operator you indicated in the previous question?

**Annex 49: Profile of averages of dimensions against contract time**



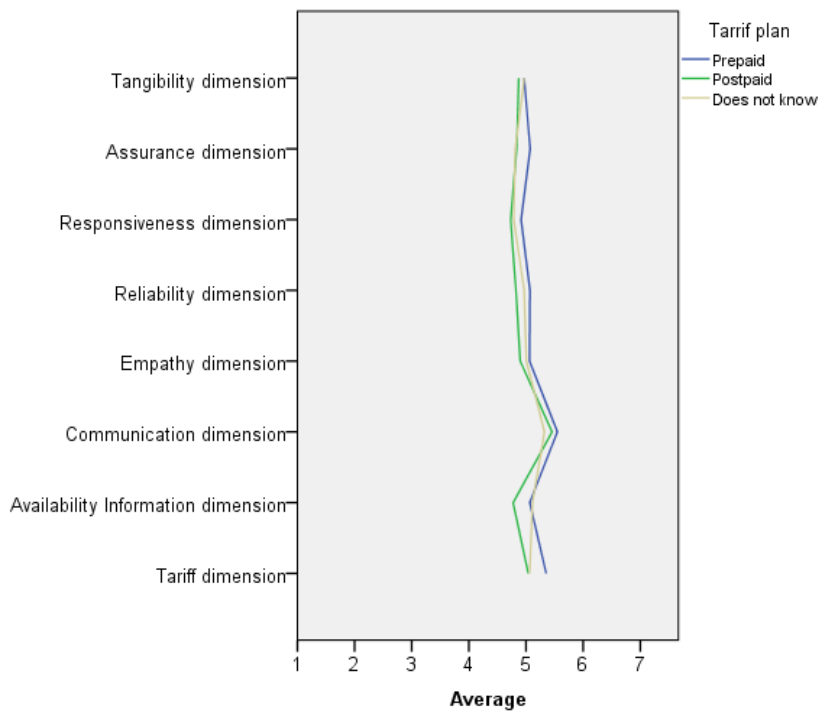
**Annex 50: Hypothesis test to the equality of several populational distributions of the Tariff plan variable**

	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	1,067	2,924	1,798	3,395	2,104	1,896	4,648	7,830
df	2	2	2	2	2	2	2	2
Asymp. Sig.	,587	,232	,407	,183	,349	,388	,098	,020

a. Kruskal Wallis Test

b. Grouping Variable: What is your tariff plan?

**Annex 51: Profile of averages of dimensions against the Tariff plan**





**Annex 52: Hypothesis test to the equality of several populational distributions of the Service with greater importance variable**

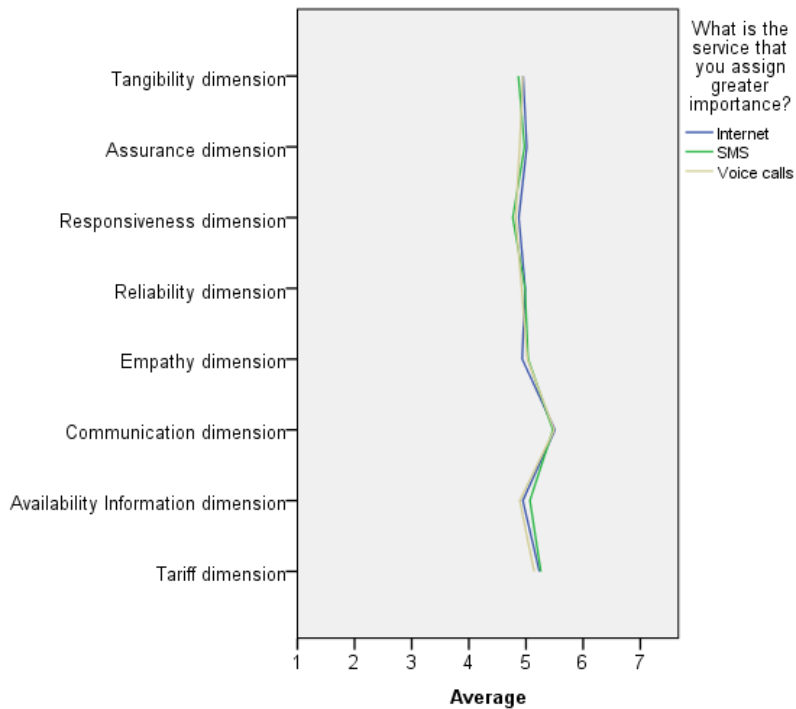
Test Statistics<sup>a,b</sup>

	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Chi-Square	,732	1,476	,273	,391	,790	,816	1,059	1,805
df	2	2	2	2	2	2	2	2
Asymp. Sig.	,693	,478	,872	,823	,674	,665	,589	,406

a. Teste Kruskal Wallis

b. Variável de Agrupamento: What is the service that you assign greater importance?

**Annex 53: Profile of averages of dimensions against service with greater importance**

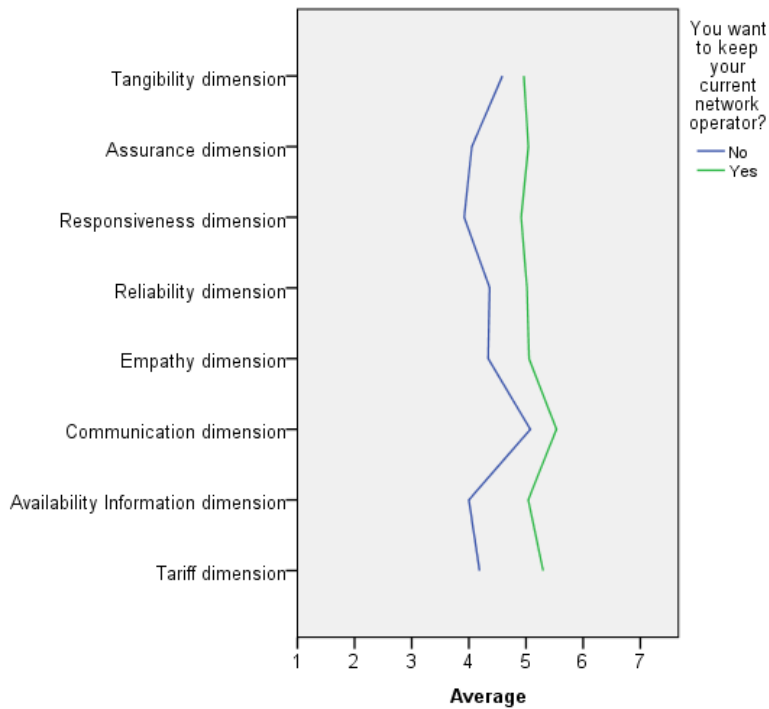


**Annex 54: Hypothesis test to the equality of two populational distributions of the Staying with the current network operator variable**

Test Statistics <sup>a</sup>								
	Tangibility dimension	Assurance dimension	Responsiveness dimension	Reliability dimension	Empathy dimension	Communication dimension	Availability Information dimension	Tariff dimension
Mann-Whitney U	5016,000	3919,000	3856,500	4625,500	4467,000	5528,500	3938,000	3609,000
Wilcoxon W	5646,000	4549,000	4486,500	5255,500	5097,000	6158,500	4568,000	4239,000
Z	-2,208	-3,868	-3,961	-2,801	-3,040	-1,438	-3,869	-4,374
Asymp. Sig. (2-tailed)	,027	,000	,000	,005	,002	,151	,000	,000

a. Grouping Variable: You want to keep your current network operator?

**Annex 55: Profile of averages of dimensions against staying with the current network operator**



**Annex 56: KMO and Bartlett's Test**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,966
Bartlett's Test of Sphericity	Approx. Chi-Square	11049,284
	df	528
	Sig.	,000

**Annex 57: Total Variance Explained**

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17,478	52,964	52,964	17,478	52,964	52,964
2	1,927	5,840	58,805	1,927	5,840	58,805
3	1,323	4,009	62,813	1,323	4,009	62,813
4	,963	2,917	65,731			
5	,908	2,751	68,482			
6	,816	2,473	70,954			
7	,772	2,338	73,293			
8	,716	2,170	75,463			
9	,654	1,981	77,444			
10	,574	1,741	79,185			
11	,535	1,620	80,805			
12	,515	1,561	82,365			
13	,503	1,524	83,890			
14	,488	1,479	85,368			
15	,455	1,378	86,746			
16	,418	1,265	88,011			
17	,368	1,116	89,127			
18	,353	1,069	90,197			
19	,326	,988	91,185			
20	,313	,947	92,132			
21	,302	,916	93,048			
22	,251	,761	93,809			
23	,239	,724	94,533			
24	,232	,703	95,236			
25	,222	,671	95,907			
26	,212	,643	96,550			
27	,209	,633	97,184			
28	,203	,616	97,800			

## Assessment of the Quality of Mobile Telecommunications Services

			Total Variance Explained		
29	,178	,539	98,339		
30	,154	,466	98,804		
31	,144	,435	99,239		
32	,132	,401	99,640		
33	,119	,360	100,000		

Extraction Method: Principal Component Analysis.

### Annex 58: Rotated component matrix

Rotated Component Matrix <sup>a</sup>			
	Component		
	1	2	3
As a user, when you have an unresolved situation, your network operator demonstrates determination to solve it	<b>,832</b>	,246	,110
Your network operator is effective in solving problems	<b>,826</b>	,249	,137
Your network operator always tries to help you	<b>,813</b>	,272	,177
Your network operator provides a quick and efficient service	<b>,805</b>	,267	,149
The employees of your network operator are clear and objective in information they provide	<b>,800</b>	,228	,251
The employees of the network operator have a response capacity in answering to the client's complaints	<b>,797</b>	,148	,251
Your network operator always provides information about when the contracted services will be performed	<b>,771</b>	,298	,206
Your network operator provides information clearly and objectively	<b>,749</b>	,304	,148
Your network operator is always looking for what is best for the client	<b>,739</b>	,202	,265
The employees of your network operator have the expertise to answer the questions you ask them	<b>,727</b>	,162	,352
Your network operator can perform its services on the first try	<b>,724</b>	,189	,250
Your network operator provides adequate information	<b>,719</b>	,440	,221
Your network operator meets the deadlines	<b>,708</b>	,252	,208
The employees of your network operator transmit you confidence and make you feel safe	<b>,689</b>	,236	,378
The provision of services by the network operator occurs as contracted	<b>,668</b>	,400	,121
Your network operator announces ahead of time and in an appropriate way changes in your tariff	<b>,626</b>	,323	,148

## Assessment of the Quality of Mobile Telecommunications Services

Your network operator provides you with individualized attention and personalized service (e.g. indicating the best tariff, i.e. which best suits your needs)	,611	,301	,230
The value for money of services provided by your network operator is appropriate	,603	,379	,158
The instructions about the products / services provided by your network operator are clear and self-explanatory	,598	,198	,395
The employees of your network operator are always kind and polite to you	,592	,247	,383
You feel safe regarding the information you provide to your network operator, because it will not disclose them or use them incorrectly	,562	,239	,302
Your network operator has a better image than compared to its competitors	,481	,378	,297
The systems, equipment and their network operator tools are modern and effective	,453	,398	,433
Your network operator provides entertainment during the waiting time (e.g. background music, magazines, television, etc.)	,389	,222	,314
Your network operator has a sufficient number of shops at the service of the client.	,245	,804	,247
The quality of voice calls made through your network operator is good.	,220	,803	,135
Your network operator has a good network coverage nationwide	,178	,753	,110
The payment methods provided by your network operator are appropriate	,433	,631	,156
Your network operator provides different means to contact it (shops, website, telephone line service for clients, e-mail and postal mail)	,322	,590	,325
Your network operator has working and service hours appropriate to many of its client's	,381	,560	,273
The employees of your network operator have a groomed appearance and dress appropriately for the functions they perform	,211	,223	,769
Your network operator has good accessibility for the disabled (walking difficulties, communication difficulties, etc.)	,198	,093	,737

## Assessment of the Quality of Mobile Telecommunications Services

The facilities of your network operator are attractive / appropriate	,233	,329	,717
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Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.