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Quality in Telecommunications Services: Theoretical Contributions and Recommendations for the ITU

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Abstract

The purpose of this article is to re-invigorate the understanding about the distinction between perceived and objective quality and their alignment with the concepts of QoE and QoS, in order to contribute to the Questionnaire of the ITU SG12 to be applied to its member countries. Through a review of the literature on the subject and the compatibility of the questionnaire's constructs in light of the ITU study (2015), it was recommended (a) to adopt a theoretical model that contemplates the phenomenon's complexity and that would subsidize the survey; (b) the adoption of the ITU study's theoretical framework (2015) with a clear conceptual differentiation between QoS and QoE for structuring the questionnaire to be implemented in member countries.

Key Words: *Perceived Quality, Satisfaction, ITU, QoE, QoS.*

Introduction

In Brazil, the National Telecommunications Agency (Anatel) is the institution responsible for regulating the sector. This segment is known to have great strategic value for the country, seeing as it is paramount the services provided have good quality and a good price. The Agency assumes the mission of regulating the telecommunications sector to contribute to Brazil's development and aims to be recognized as an institution of excellence that promotes a favorable environment for communications to the benefit of Brazilian society.

Anatel's Ombudsman's Office assumes the role of providing critical analyses of the Agency's activities and, to that end, commissions a series of studies, opinions and reports on the internal and external realities of the

institution. The results of these analyses guide the Board of Directors of the Agency, a group to which the ombudsman is not subordinated to, and keep society informed about its operation, always with clear and independent interpretations supported by scientific rigor.

The International Telecommunication Union (ITU) is the specialized UN institution for information and communications technology. Its goal is to connect the world, ensuring to all the fundamental right to communicate, through extensive studies and promoting the development of the telecommunications sector. It's activity is divided into three main areas: radiocommunication, standardization and development. The first aims at managing the global satellite orbits and radio spectrum networks, as well as developing international standards for radiocommunication systems. The standardization segment brings together experts from all over the world to formulate recommendations and international standards of quality and telecommunication network infrastructures. And the development sector involves studying and promoting means to develop networks accessible to all, as a way to stimulate economic and social development around the globe. Each of the sectors is composed mainly of study groups (SG) formed by experts in various fields dedicated to the study of specific subjects. The SG12, concerned with the standardization sector, addresses issues related to the "quality" theme, of interest to the present work, among them the concepts of quality of experience (QoE) and quality of service (QoS).

The interaction between the Anatel and the ITU is made possible through the work of the four Brazilian Communications Commissions (CBCs), which work together to discuss and represent Brazil's position on the issues discussed by the ITU. The CBC3, about Telecommunication Standardization, coordinates the Brazilian participation and positions in the Telecommunication Standardization Advisory Group (TSAG), the ITU Standardization Study Group (ITU-T) and other national and international organizations whose discussion is directly related to the topic.

The SG12 introduced a Work Plan that involves, among other actions, the construction and application of a questionnaire to member countries. Its objective is to collect information to subsidize the creation of international references in regulatory research and to provide assistance to countries in the development of their quality management frameworks (Annex II "Questionnaire - Status of National Quality Measurement Frameworks" from the document SG12-C.0062, ITU-T / SG12, 2017).

Based on a review of concepts and theoretical and empirical models on quality, the present work aims at (a) refreshing the understanding about the distinction between perceived and objective quality and their conformity with the concepts of QoE and QoS, respectively; (B) contributing to the discussion on quality and satisfaction in the market environment of telecommunications regulation technology; and (c) bringing both content and structure contributions to the SG12 preliminary questionnaire that clearly address that conceptual distinction and the main relevant dimensions in the study of quality in telecommunication.

Methodology

Encouraged to participate and cooperate with the process of clarification and conceptual operations regarding the quality construct, Psychometrics experts of Anatel's Ombudsman's Office: (a) reviewed through document analysis the literature on quality and satisfaction in order to sort fundamental aspects about the conceptualization of objective quality and perceived quality in light of the QoE and QoS definitions used by the ITU. And (b) through theoretical and constructive convergence analysis, made the main axes, factors and items of the SG12 preliminary questionnaire proposal (Annex II of SG12-C.0062, ITU-T 2017) compatible with the axes and factors of the ITU Study Questionnaire (2015), considered appropriate for this research's purposes.

Considering the relevance of the findings obtained through literature review or document analysis to support the analysis of theoretical convergence, we chose not to present them in the introduction of this article but in the first part of the results section instead.

Results

In this section, we present the results of the theoretical exploration on quality and satisfaction and of the theoretical convergence analysis with propositions to the structure of the SG12 preliminary questionnaire.

Quality

Quality is a widely discussed but little understood construct within the scope of investigations on consumer behavior. There are great divergences of understanding on the subject, although it ought to be understood in light of a theoretical model. However, the diatribe generated in the related literature gives us a dimension of the controversies.

“Quality is a property, attribute or condition of people, capable of distinguishing them from one another and determining their nature. On a scale of values, quality is a property, attribute or condition that allows one to evaluate and, consequently, approve, accept or refuse anything.” (Ferreira).
“Quality is meeting the customer's needs.” (Crosby)
"Quality is what the customer perceives when he feels that the product or service meets their needs and their expectations" (Towsend)
“Quality is the entirety of the properties and characteristics of a product or service that give it the ability to satisfy explicit customer needs." (ISO 8402 – Quality Vocabulary). (Quoted by Almeida, 1994, p.5).

Quality can be understood as the condition of a product or service creating value for the consumer or excellence in behavior based on defined criteria. The array of interpretations is genuinely diverse. Despite its extent, not even the ISO operational definition can encompass the entire conceptual dimension or establish convergence.

In approaching the concept of quality in telecommunications, it is understood that regulatory procedures should include objectives for network innovativeness, infrastructure performance, research and development, training, public safety standards, realistic quality standards relying on the consumer perception, seeing as the regulatory body must act in the interests of society (BRASIL, PR, CC, 1995 - Law No. 9,472). And when the assessors are the consumers themselves, competition is perceived as working to add quality and efficiency to services.

The ITU uses a model subdivided in Quality of Service (QoS), Quality of Experience (QoE) and network performance (NP). QoS is "the entirety of a telecommunications service’s characteristics with the capacity to meet both stated and implicit needs of the service user" (ITU, 2017, p.18). They reflect common opinions about telecommunication systems, networks and services. It refers to the perception of the user (whether they are people or machines) regarding aspects of the services and is influenced by numerous factors such as social trends, advertising, tariffs and costs related to the customer's expectations. Some of its requisites are: user statements about performance requirements (QoSR), statements on quality level intended and delivered to the customer by the service provider (QoSO), statements on the QoS level attained or delivered to the customer (QoSD), statements that express the quality level users believe they have experienced (QoSE), which is generally assessed by customer surveys and comments.

Quality of experience (QoE), in turn, is the degree of content or discontent of a service user (ITU-T, 2016; ITU, 2017). It is influenced by factors such as the type and characteristics of the application or service,

context of use, expectations and user achievement in relation to services, user cultural background, socioeconomic issues, psychological profiles, user emotional states. QoE is measured by the users of an application or service, considering the influence factors presented and their results are presented in scales, multidimensional representations or verbal descriptors. They are related to user expectations, user context, potential discrepancy between the service offered and the individual user's awareness about the services. According to ITU (2017), QoE differs from QoS, since the former is based on the user's perception of the service provided, is measured subjectively and may differ from one user to the other.

Unlike QoS, which involves the result of user experience or perception, network performance (NP) is determined by the efficiency of its elements. The concept has a purely technical character and can be understood as the ability of the network to provide functions related to communications between users. Objectives that can be measured and whose results can be presented quantitatively are specified in terms of performance parameters (ITU, 2017).

A certain conceptual overlap between NP and QoS, as well as between QoS and QoE was noticed. QoS seems to acquire characteristics in intersection with NP when the ITU (ITU, 2017) considers that QoS represents a part of NP and both concepts involve the technical aspect. In turn, there is an intersection between QoS and QoE. The definition of QoS involves user opinions and perceptions of telecommunications services, aspects intrinsic to QoE.

In addition, QoSE is a QoS division, which involves the quality level users believe (belief) to have "experienced" and that makes that overlap even larger. The way indicators are measured, used as differentiating elements, are also superimposed, since QoSE, also called perceived QoS by the ITU itself, is evaluated by customer research, instrument or methodology commonly used to evaluate QoE.

In light of the presented ITU's conceptualizations, the history and other quality models that go beyond the scope of telecommunications, but remain related to consumer practices, have been revisited, along with consumer psychology theories, to understand the convergence between them and shed a little light on this theoretical field.

It is important to emphasize that consumers tend to evaluate the quality of services in different ways, taking into account different cultures, values and individual needs. Therefore, research with different demographics, from different social classes, ages, sexes, cultures, among others, becomes essential. For practical purposes, performance is understood as quality of service and vice versa.

In the 80's, the attempt to define a paradigm for service quality led to the operationalization of pioneering works in the area. However, more empirical experiments emerged at the end of the last century (Grönroos, 1984; Parasuraman et al., 1985, 1988, 1991a, 1991b, 1991c, 1993, 1994a, 1994b; Brown & Swartz, 1989; Eiglier et al., 1989 ; Carman, 1990; Bolton & Drew, 1991a, 1991b; Nguyen, 1991; Cronin & Taylor, 1992, 1994; Boulding et al, 1993; Tears, 1993, 1994; Ballantyne et al., 1994; Taylor & Baker, 1994). Zeithaml (1988) and, more recently, Alves (2005) and Morgeson III, Sharma and Hult (2015) emphasize that service quality influences consumer choice behavior. At the aggregate level of the company, it becomes a competitive strategy (Garvin, 1987; Keizer, 1988).

It is imperative that those who delegate and those who provide public services to society research the needs, expectations, desires and perceptions of their performance among their users. Researches of this nature allow for the configuration of regulatory scenarios that result in social gain, since they are based on the interests of society, producing a service management model more suitable to the interests of all those involved in the telecommunications segment in countries in general (Alves , 2005).

As such, any initiative that deals with consumer relations quality should be based on multidisciplinary models. That means they should be composed of several constructs, since one cannot have an appropriate understanding of consumption behavior from a single perspective.

Some models have been proposed and confirmed in the literature as being illustrative of satisfaction and loyalty, for example, and quality has appeared as a predictor of satisfaction. Chronologically, we find in the literature the position of Churchill and Surprenant (1982) on post-purchase evaluation inserted in the consumer process, in which the consumer satisfaction model encompasses four distinct constructs: expectations, performance, disconfirmation and satisfaction.

Expectations are the probabilistic beliefs of an attribute's occurrence, fundamental for the formation of attitudes, in addition to serving as a level of adaptation for subsequent decisions of satisfaction.

Performance is the comparison standard through which disconfirmation is accessed.

Disconfirmation arises from the discrepancy between initial expectations and current performance. Therefore, the magnitude effect of disconfirmation produces satisfaction or dissatisfaction. Disconfirmation is determined by the difference between expectations and performance, which has a dominant effect on the satisfaction construct, albeit in tandem with affective and motivational factors.

Satisfaction arises from the comparison of buyer's rewards and costs of purchase in relation to the anticipation of post-decision consequences, being the sum of satisfaction and several product or service attributes.

Rodrigues (2000), in a detailed analysis of the concept of quality, argues that the distinction between objective quality and perceived quality is fundamental. According to the author, the understanding of perceived quality is supported by a process of comparison between consumer expectations and perception of service performance. In turn, the objective quality is related to technical superiority. Thus, the measurement of superiority is compared to one criterion (Garvin, 1983, 1987).

Zeithaml (1988) considers that quality assessment is done at the level of the consumer's "evoked set". In this sense, Rodrigues (2000) and Rosa (2001) posit that the perceived quality is the result of the comparison between those priorities or service or product attributes and the perception they have of what the company offers as a way of contemplating their expectations.

Thus, the perception of the quality of services follows the expectation disconfirmation paradigm applied in consumer satisfaction studies (Rosa, 2001; Rodrigues, 2000). However, it is important to note that the criterion of predictive expectations is adopted for satisfaction studies, that is, expectations are predictive of satisfaction when confirmed.

It is observed that if quality can influence choice, post-purchase and consumption behavior, and still serve as guideline for a marketing strategy by a service provider, it seems fundamental that the construct be treated with propriety and comprehended by market regulators homogeneously.

Indeed, in a market management analysis implemented through multivariate techniques based on structural equation models, Alves (2005) has evidenced, through the review of Anatel's service quality indicators, that the concept is adequately constituted in three large dimensions, namely: user reaction, customer service (software) and provider network (hardware). As such, the Perceived Quality Index for postpaid and prepaid mobile services (QPE) was proposed. Their conceptual and factorial structure is presented in figures 1 and 2 (Alves & Pasquali, 2005).

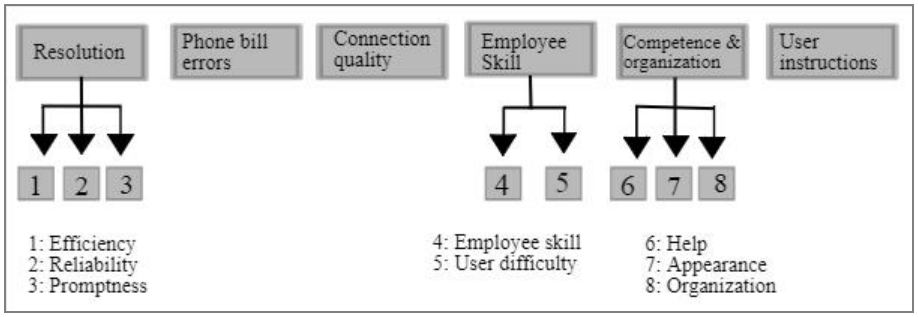

Figure 1: QPE conceptual structure in postpaid mobile services. Adapted from Telefonia celular: avaliação da qualidade percebida (QPE), by A. R. Alves and L. Pasquali, 2005, Brasília: Anatel / LabPAM.

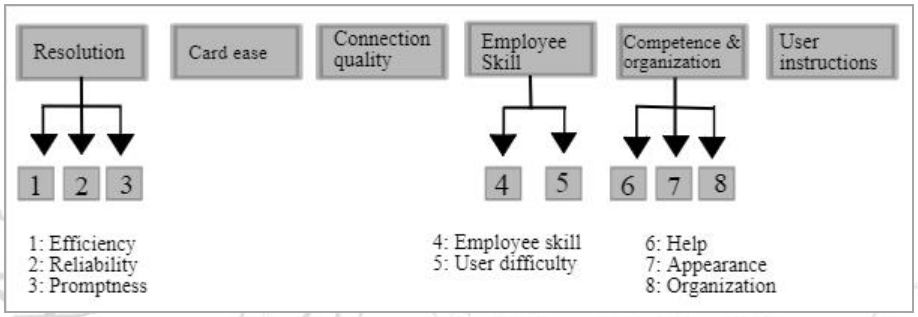

Figure 2: QPE conceptual structure in prepaid mobile services. Adapted from Telefonia celular: avaliação da qualidade percebida (QPE), by A. R. Alves and L. Pasquali, 2005, Brasília: Anatel / LabPAM.

Morgeson III, Sharma and Hult (2015), in agreement with Alves (2005), confirm quality as a mediating variable in consumer behavior and describe satisfaction as an attitude and therefore a latent trait or a psychological variable that leads to loyalty and defines the consumer's reaction (complaints). Figure 3 presents a model that relates expectation of perception, quality, values, satisfaction, complaints and loyalty.

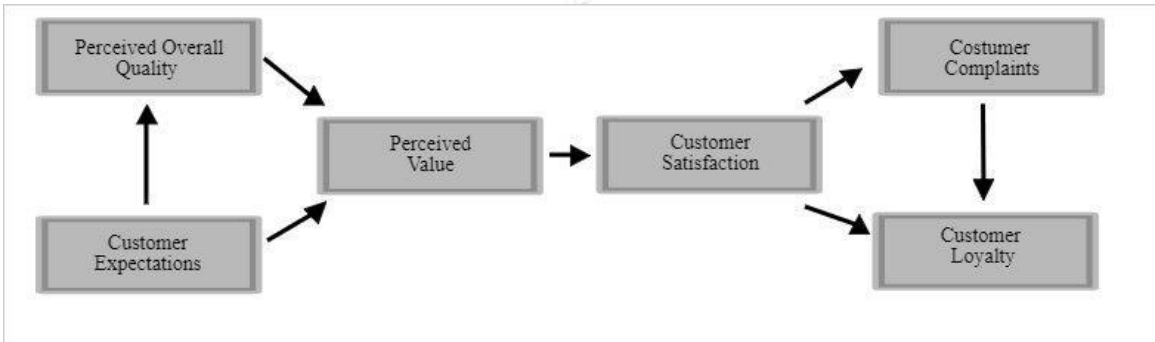

Figura 3: American Customer Satisfaction Index (ACSI). Adapted from "Cross-National Differences in Consumer Satisfaction: Mobile Services in Emerging and Developed Markets" by F. V. Morgeson III, P. N. Sharma and T. M. Hult, 2015, Journal of International Marketing, 23, 2, 2015, pp. 1-24.

The ITU Telecommunication Development Bureau (BDT), with the help of specialized consultancy, published the study "Regulatory Legal Framework and Research on Consumer Behavior of

Telecommunications Services in Latin America" (UIT, 2015)[1]. The objective of the report was to provide an analysis of best practices regarding the consumer of telecommunications services in twenty Latin American countries considering demographic, competition and regulatory aspects, cross-referenced with the theme of quality. The theoretical model of the study is presented in figure 4.

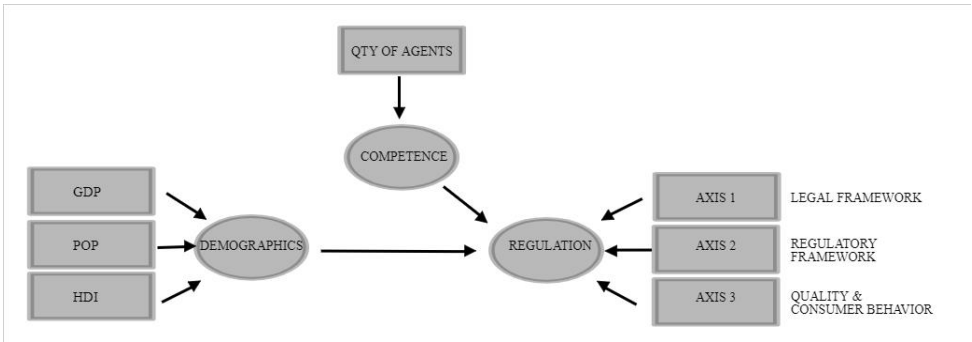

Figure 4: Theoretical model of the study. Adapted from Marco legal reglamentario e investigación sobre el comportamiento de los consumidores de los servicios de telecomunicaciones en América Latina (p. 22), by Unión Internacional de Telecomunicaciones – UIT, 2015, Ginebra: UIT.

The twenty studied countries were: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, El Salvador, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the Dominican Republic, Uruguay and Venezuela.

The axes (a) legal and consumer protection framework, (b) regulatory framework on quality and (c) perception of quality and consumer satisfaction constitute the regulatory dimension. For this investigation, a questionnaire with 25 items was employed to assess the three regulatory axes through seven factors. Their factorial structure is presented in figure 5.

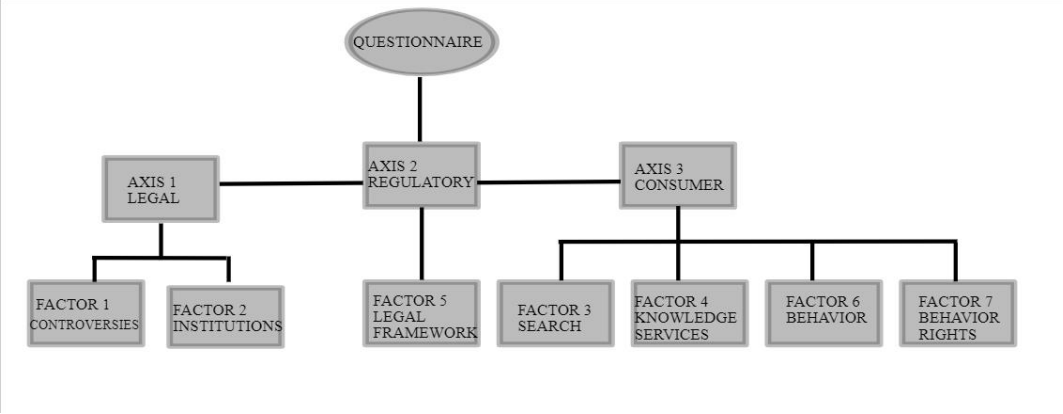

Figure 5: Theoretical model of the questionnaire. Adapted from Marco legal reglamentario e investigación sobre el comportamiento de los consumidores de los servicios de telecomunicaciones en América Latina (p. 26), by Unión Internacional de Telecomunicaciones – UIT, 2015, Ginebra: UIT.

[1] The XXVI Meeting of the Permanent Consultative Committee (PCC) charged CITEL with disseminating the document among Member States as well as with requesting the Rapporteur Office on the Protection of Telecommunications Services User Rights to include this report in the Technical Folder entitled "Telecommunication services user rights" in order to contribute to its diffusion (PCC.I / DEC. XXVI-15 in OEA, CITEL, 2015).

Under the legal framework axis, we sought to identify the legal instruments that countries with consumer protection defense offices have in order to resolve disputes between service providers and telecommunication users, as well as the institutions and tools available for the protection of consumers. Research on regulatory frameworks was based on the existence of quality regulations and their competence to protect society. As for the consumer behavior and quality perception axis, the objective was to examine the existence of studies that evaluate consumer satisfaction, their level of knowledge about services, their behavior and their level of knowledge about their rights. The operational definitions of the axes and the factors of the theoretical model in addition to the ITU study questionnaire (UIT, 2015, p. 25-26) are herein presented.

"Axis 1 – Legal framework of consumer protection defense. This dimension aims at identifying the legal instruments available to consumer protection defense offices that exist in all Latin American countries. It comprises factors 1 and 2; namely:

Factor 1 – Controversies between telecommunications service providers and users. It deals with how consumer protection defense offices of different countries resolve disputes between consumers and operators.

Factor 2 – Concerns the institutions and tools available to support the protection of consumers. It deals with the characterization of the tools that protect consumers.

Axis 2 – Regulatory framework. This dimension aims at studying the existence and market management style by the regulatory agencies of the telecommunications economic sector. It comprises Factor 5.

Factor 5 – Concerns the legal framework based on quality and competence to protect society. It aims at identifying performance indicators of operators.

Axis 3 – Consumer behavior and perception of quality. It aims at studying how consumers understand consumer relations, rights, opportunities to express their opinion through consumer surveys, knowledge of the economic sector of telecommunications and consumer behavior. This axis comprises the following factors:

Factor 3 – Studies that assess the level of consumer satisfaction in relation to telecommunications services.
Factor 4 – Degree of consumer awareness regarding services in the telecommunications sector.
Factor 6 – Consumer behavior.
Factor 7 – Degree of knowledge of their rights as consumers." (UIT, 2015, p. 25-26)

With reference to the paradigm of disconfirmation, it is important to address the psychological process of perception, through which the perception of quality is built and which is exclusively found in the judgment capacity of the individual consumer. Human beings are embedded in a world that overflows with sensations and people systematically react to them. They are aware of some stimuli but oblivious to others. Thus, the characteristics of the products consumers choose to pay attention to often turn out to be different from what the suppliers would like them to be, despite all their efforts to the contrary. This is perhaps one of the reasons for postulating that total satisfaction, with maximum score within a given scale, will probably never exist. Be it because the consumer is in a process of cognitive dissonance, or because he cannot perceive the performance of the product or service as desired.

This is because every individual adds their vision to things by assigning value and meanings that are consistent with their own experiences, impressions and desires. In this way, it is necessary to understand that there is a process of absorption of information and sensations on the part of the individual to interpret the surrounding world.

The human brain receives sensory inputs, which are raw data that initiate the perceptual process. The sensations that people experience are the result of context effect, and as such, they subtly influence what individuals think about the product they have acquired. Thus, consumer surveys have been pointing to interesting findings, such as: a consumer can present a more critical evaluation of a particular product when it is in a certain condition but a less rigorous evaluation in a different condition. The stimuli we perceive are often ambiguous, so it is up to the individual to determine their meaning based on their previous experiences, expectations and needs.

These evidences characterize the need to make an operationalization of the characteristics of a product or service, in objective terms, which are mentioned by the consumers themselves as being those that they would like to find in a post-purchase evaluation as meeting their previous expectations (Oliver, 1999). This procedure is, in fact, one of the stages of the construction process of research instruments, aimed at defining to which set of stimuli the consumer will indeed want to react. This implies also giving validity to the metrics to be used (Pasquali, 2010).

In general, consumers react to the characteristics (stimuli) of products based on the scheme or set of beliefs. The pre-activation of certain properties of a stimulus evokes a scheme, which favors the comparison of this stimulus with other similar ones with which the consumer has already had contact (Solomon, 2016).

Identifying and evoking the right scheme are crucial to the market, as they determine which criteria will be used to meet the expectation and to proceed with a post-purchase evaluation on the product. This process can be determinant of positive disconfirmation from the perception of quality.

Moreover, it seems reasonable to apply the expectation model to consumer behavior for the amount of alternatives that an individual can adopt regarding purchasable brands or products. A consumer may, for example, have to choose between a number of folder service plans, although they already expect to opt for the cheapest. Hansen (1969), through a series of studies, found that desired outcomes and perceived expectations are predictors of both declared preferences and consumer choices in purchase simulation situations.

On the concept of force, Vroom (1964) suggests that people's beliefs about their expectations, instrumentality and valence interact psychologically to create a motivational force to act in order to obtain satisfaction or escape from suffering. Behavior is assumed, then, as a force field with direction and magnitude. We can think of the concept of force as a representation of a person's intention to act in a particular way.

The author uses the term valence to refer to the instrumental value of the object in terms of results. A result is seen as having positive valence for an individual if they prefer to have it to not have it (Figure 6). On the other hand, we say that when an individual prefers to avoid a certain result, it has negative valence. It suggests that the instrumental is the belief of the probability of linking a result (performance level) to another result (satisfaction). In fact, Oliver's analysis (1980) recovers the importance of satisfaction expectation and Vroom, in turn, recovers the valence of the objects.

This stance establishes that decision-making is a cognitive activity based on beliefs, in the sense that the decision allows for future, positive consequences. Thus, it can be concluded that individual and cultural values influence the expectations and valences in relation to a product or service and these, in turn, influence the decision-making of the consumer in relation to them. It is therefore imperative to consider these variables when it comes to a study of consumer behavior and constructs such as satisfaction and perception of quality.

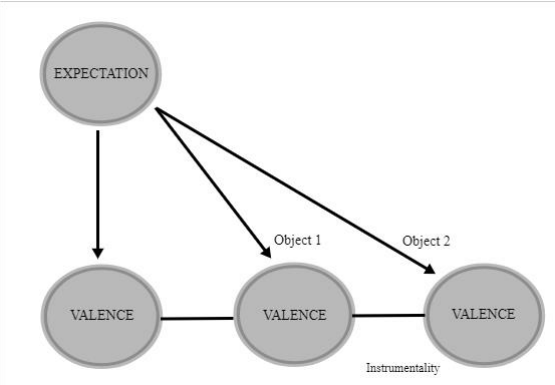

Figure 6: Interpretive diagram of expectation, in Vroom's view, 1964. Adapted from A satisfação do consumidor no contexto da psicologia de mercado: aplicação ao serviço móvel celular – um modelo estrutural (p. 26), by A. R. Alves, 2005, Brasília: Universidade de Brasília.

That being said, (a) the conceptual distinction about perceived quality and objective quality (Rodrigues, 2000, Alves, 2005, Morgeson III, Sharma & Hult, 2015) and QoE and QoS concepts are defended; and (b) service quality is considered to be embedded in multifactorial models that involve expectations of perception, values, satisfaction, complaint and loyalty with fundamental implications on evaluation and control procedures important for quality management in a telecommunication competition environment.

SG12 Questionnaire Analysis

With a similar approach to the study "Regulatory Legal Framework and Research on the Behavior of Consumers of Telecommunications Services in Latin America" (ITU, 2015), the ITU-T (SG12) has been debating the concept of quality from a technical perspective of services and consumer experience, as well as measurement alternatives, mainstreaming on the subject, in accordance with resolution 95 (Hammamet, 2016) of the AMNT16 of Tunisia. The Group understands the importance of contributing to developing countries in identifying difficulties and implementing actions to improve the quality of telecommunication services and, to that end, has considered it relevant to have an image of the maturity level of their regulatory approaches established for the improvement of quality.

SG12 then started a Work Plan which involves, among other actions, the construction and application of a questionnaire to member countries with the objective of collecting information to subsidize the creation of international references in regulatory research and to provide assistance (Annex II "Questionnaire - Status of National Quality Measurement Frameworks" of document SG12-C.0062, ITU-T / SG12, 2017).

Considering the theoretical framework and relevance of the ITU Study (2015) on the subject in the Americas region and recommending that its reference framework be adopted in full by the other ITU member countries, this framework was used as a basis for the analysis of the constructs of the preliminary SG12 Questionnaire proposal formulated in January 2017, as of the 1st SG12 Meeting after WTSA-16. The Group stipulated that the aforementioned questionnaire proposal would be improved so that it could be submitted for consideration and approval at the next meeting in September 2017 in Geneva, Switzerland.

The SG12 questionnaire is structured in two parts. The first section, composed of eight items, where four are dichotomies and four are constructed answers, was reserved for those countries that do not have telecommunications quality regulations. It sought to evaluate the following attributes: relevance given to the number of user complaints, competition in the sector, provision of information on quality of services to users, urgency in implementing the regulatory framework, types of quality problems reported, problems in the implementation of the regulatory framework, opportunity to develop skills for the regulatory framework

and standards implementation, guides and useful references for improvement. The second part, comprised nine items, five of which were multiple choice, three dichotomies and a matrix of constructed responses. It was reserved for countries that already have telecommunications quality regulations and sought to evaluate the following attributes: specification of the services contemplated in the regulatory framework, indicators used to measure QoS and QoE, their strategies and agents, periodicity of quality measurement by indicators, the existence of indicator goals, the specificity of the goals for different competition contexts, contingency implementation in case of non-compliance with goals, feedback to users on the quality of services, existence of surveys to evaluate telecommunications services satisfaction.

By theoretical convergence or construct analysis, the items in the preliminary SG12 Questionnaire proposal (Annex II of SG12-C.0062, ITU-T 2017) were compared with the axes and factors of the ITU Study Questionnaire (2015). Their results were summarized in table 1.

Table 1: Amount items of the SG12 questionnaire (ITU-T, 2017) and results of the theoretical convergence with the axis and the factors of the ITU model and questionnaire (2015).

Axis (ITU, 2015)		**Factor (ITU, 2015)**		**Quantity SG12 (ITU - T, 2017)**
Code	**Name**	**Code**	**Name**	
3	Consumer behavior and perception of quality	3	Research to measure the degree of user satisfaction about telecommunications services	1
		4	Users' knowledge of telecommunications services	3
		6	User behavior	2
2	Regulatory framework	5	Regulatory instruments	10
Total				**16**

Of the 17 items in the questionnaire (Annex II of SG12-C.0062, ITU-T 2017), one deals with competition and was excluded from the analysis, ten deal with the "Regulatory Framework"[2] axis under the ITU theoretical model and six refer to "Consumer Behavior and Quality Perception". It was observed that, although the theoretical framework developed for ITU had been considered of relevance in the investigation of quality regulation and promotion practices, the questionnaire (Annex II of SG12-C.0062, ITU-T 2017) did not include the "Legal framework of protection and consumer protection" Axis. That is extremely relevant when we deal with the quality issue, since it is intended to verify the availability of legal instruments related to consumer protection defense offices in several countries in the region of the Americas.

In addition, the questionnaire (Annex II of SG12-C.0062, ITU-T 2017) addressed only four of the seven factors proposed by the ITU Study Framework (2015). Factors did not include, for instance, aspects such as "degree of knowledge of their rights as consumers".

The content of the preliminary proposal of SG12, specifically in the section reserved for countries that already have a quality regulation framework, would basically aim to obtain information about the objective quality of services (QoS), while the ITU Study (2015) presents as the most adequate model to obtain the information about the regulatory scenario of the perceived quality or result of the consumer experience (in tandem with the QoE), but also addresses aspects objective quality.

[2] The SG12 questionnaire items related to the section "Those countries that already have a regulatory quality framework should answer the next questions" and which deal with indicators and aims (1 to 6) were considered as related to the "Regulatory Framework" and "Regulatory Instrument" Factor.

It is considered that the proposal and the adoption of an empirically tested model are conducive to promoting the required validity of the data collection process together with the various ITU signatory countries. This was due to: (a) the absence of a pre-defined theoretical model for the preliminary proposal of SG12, aligned to a multifaceted and substantiated map of the subject, an issue closely related to the validity of the results to be obtained by means of the instrument; and (b) the conceptual definitions of QoS and QoE presenting some overlap between them.

Also on the section of the questionnaire proposed to SG12 (Annex II of SG12-C.0062, ITU-T 2017) related to countries that already have a quality regulation framework, a series of punctual suggestions was made. It was suggested that (a) a possible conceptual confusion between QoS and QoE should not be allowed to permeate a survey of international information and that the questionnaire itself should have a pedagogical function in distinguishing the dimensions and appropriate ways of measuring technical and experienced quality ; (b) make it clear that surveys conducted through scales or surveys are instruments or measurement strategies that provide information and indicators of evaluation of perceived quality and consumer satisfaction, such as latent traits that approach conceptually QoE; (c) in the absence of theoretical clarification about what was being asked, respondents could be influenced by the objective-quality technical focus of an item at the beginning of the questionnaire and respond to the next issues dealing with indicators and targets and feedback on Quality, which has a more comprehensive pretension, as strictly related to QoS, leaving perceived quality to the background, as there were no elements of a distinctive design for QoE; (d) increase the number of questions about QoE to allow better detailing of the construct and to guarantee a greater degree of validity for its measurement.

The conceptual distinction between objective quality (technical or operational) and perceived (experienced) quality is relevant and must be understood by the countries' respondents, in order to make findings more valid. Thus, it was suggested that the reformulation of the SG12 preliminary questionnaire contemplate this didactic division of items, in sections specific to each of these constructs.

In line with the doctrine's recognition of the need to distinguish between objective quality and perceived quality, as well as the causal relation between the two constructs (Morgeson III, Sharma & Hult, 2015), which have a direct impact on consumer behavior (Alves, 2005) and in light of the need to understand consumer relations in a multidisciplinary way and of the proper evaluation of perceived quality, Anatel's Ombudsman's Office recommended that SG12 review and consolidate the questionnaire produced in the following terms:

a) Should use the theoretical framework of the ITU Study (UIT, 2015), composed of the regulatory, consumer and legal axes.
b) Should use the questionnaire of the ITU Study (UIT, 2015) as the main basis of the preliminary proposal of SG12 (Annex II of SG12-C.0062, ITU-T 2017), considering that they have been fully adherent and aligned with the theoretical framework.
c) Should remodel it, making the concepts of QoS and QoE clearly distinct, including through separate sections of the questionnaire, in order to facilitate the understanding of respondents on the evaluated "objects" (or constructs) and to promote a better pedagogical design of the constructs.
d) Should incorporate QoS-related items into the ITU Study Questionnaire (UIT, 2015) to expand the scope of its research regarding the countries.
e) Should promote a semantic analysis of the questionnaire, seeking a balance of comprehension about the items, considering that the data collection will be of a cross-cultural nature. Additionally, should promote an analysis of assessors to reach evidence on the relevance and alignment between items and constructs.

A proposal for a questionnaire that contemplates the recommendations above was produced and sent to SG12 for their consideration.

Discussion and Conclusions

In order to implement quality indicators as determinants of satisfaction properly, it is important that an analysis be made of their constitutive definition and that it be operationalized, thus allowing all respondents to have the same understanding about the quality construct. To that end, it is necessary to have the studies about the phenomenon in the literature of the last two decades as a parameter.

In a technology market environment, regulators need to adopt control measures on quality and satisfaction, as well as metrics connected to network quality. In addition, when looking at quality alone, independently from a model, and to the detriment of parameters of reliability and validity that all information search instruments that involve subjective variables (that is, with a focus on the individual consumer) must present, the desired effect is distorted.

It was in this sense that the researchers of the Ombudsman's Office of Anatel tried to promote contributions on the proposed work presented to SG12, in order to have a homogenization of comprehension, by the professionals of regulatory agencies within the ITU on perceived quality and on to which paradigm it effectively belongs. However, if the concept is being treated within a telecommunications regulatory UN agency, nothing more reasonable than the standardization of a fundamental concept for those who wish to regulate and promote well-being to both consumers and investors.

With the paradigm shift that has transformed the telecommunication environment into a market context in Brazil, for example, considering the perceived quality of the service is now imperative. It is now interesting to relate it to other variables of consumer psychology, so as to present a willingness to evolve in terms of regulation, in line with what has been proposed on the constructs in developed countries.

In theoretical terms, in a monopolistic environment, quality consists of the proper functioning of a sector's operational system, regardless of satisfaction, economic performance or even loyalty, since the competitive model predicts a single competitor which is the State itself. In the opposite sphere is the state as a benchmark of economy, the concept of the Ecosystem arises and society becomes interested in the business. In fact, service quality perception becomes a part of the relational scheme between those who deliver the service and those who need to buy it.

However, depending on the treatment and the debate, it can be observed that the technical indicators or QoS in the ITU may leave too much room for the subjective opinion of the assessor, which is the company itself in this case. As such, the consumer must perform the quality judgment based on the disconfirmation of their expectations, which can be classified as QoE.

On the other hand, it is important to consider that there are a great number of variables that can be involved in the perception of quality, namely: culture, education, human values, consumer decision-making capacity, and income, among others. Therefore, this construct needs to be assessed exclusively at the individual level. Perception occurs in three stages and within a specific threshold for each individual.

Another problem that is observed regards metrics and information-seeking procedures at the individual level. Only the individual who acquires a product or service can provide the disconfirmation of a perception, since it is in fact a basic psychological process that translates stimuli into meaning. Thus, the more representation of the stimulus one has, the better one can interpret it.

The less information one has, the greater the difficulty of interpretation. In a quality assessment, the consumer needs to realize how much benefit the acquisition is adding to their expectation. This process is at the individual level and occurs solely in them. This measure is, therefore, carried out by means of psychological instruments specifically constructed and based on psychometric principles.

This work has shed light on the conceptual differences regarding perceived quality and objective quality in the context of the telecommunication services provision. It has also contributed to the constitution of an instrument for investigating this information in the ITU signatory countries within the scope of SG 12, in order to design a proposal for assessment and quality management in line with its constituent axes.

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