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A QUALITY EVALUATION MODEL FOR PUBLIC SERVICES BASED ON INTERNAL INDICATORS

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Abstract: This paper presents the development and validation of a questionnaire-based model to assess the quality of services provided by public institutions based on internal service variables. This model comprises four latent factors (Systems, Human Resources, Regulation and Relationship) that allow analyzing a set of 19 managerial variables involved in the perception of quality from the point of view of managers. The developed methodology was based on an empirical study that was statistically validated for the Brazilian federal public services, with the collaboration of the Digital Government Secretariat of the Ministry of Economy, which carried out a data collection survey with 289 services from 52 Brazilian public institutions. The model allows a standardization in the planning of the internal processes of the public services offered, with vision and administrative rationalization strategies to be adopted to optimize the quality offered by the services.

Keywords: Management information; digital government; public services; quality evaluation.

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1. Introduction

The digital transformation of public services brings new management procedures and new requirements, for example, how to assess the impact of the services provided on society. This requirement yields a change in the attitude of governments that regard the satisfaction of their users as an important source for

determining measures to improve the quality of the services provided. It is not an isolated requirement, but a consequence of a set of transformations that are redefining the role of the State, worldwide (Mergel, Edelmann and Haug, 2019).

Until recently, adopting quality assessment programs was a typical private sector initiative. In fact, theories and practices have been developed in the private sector to serve as the basis for various experiences aimed at assessing the satisfaction of users/consumers of goods and services (Hartwig and Billert, 2018). The generalization of this corporate policy allowed for a great accumulation of results. Considering the public sector, even the countries that have already implemented satisfaction rating systems, are still at the beginning of the process, despite the relevant results. Each these countries have sought to develop its own methodologies, appropriate to local circumstances and the specific characteristics of its service networks (Asif, Awan and Haque, 2016).

In the case of public services, with the increasing adoption of digital government services, there is now a demand for new instruments and tools that allow managers to evaluate actions and identify quality indicators for their services, as well as compare their initiatives with those adopted by other public institutions. According to (Kunstelj and Vintar, 2004), most tools for assessing the quality of public services focus on only one aspect of government, mainly measuring quality by considering front-office and service delivery processes to citizens. Quality cannot be limited to these aspects, as public service customers comprise different stakeholders, such as employees, taxpayers, communities, non-governmental organizations (NGOs) and non-profit organizations (NGOs), and the press. Therefore, the authors state that there is no complete service evaluation tool that enables effective quality management aimed at public services. Especially in the current context of the digital government transformation, the quality of the public service is highly dependent on its internal organization, for example the Information Technology infrastructure.

An aspect that has not yet received much attention in the literature is that there is a difference between the customer's perspective and the manager's perspective on service quality (Li et. Al., 2019). Quality, from the manager's point of view, is the quality of compliance, that ensures that the service meets the described management standards and quality specifications. This means that on the side of the service provider (internal view), quality is related to the internal processes that can represent the quality of the services it provides (Anosike and Eid, 2011; Caruana and Pitt, 1997; Wildes, 2007). However, there is still a gap in the identification of internal aspects in the public sector that can influence users' perception of quality, such as the view of public administration in the regulation of the service, human and technological resources, relationship with citizens, etc.

This work aims to identify which internal factors of the public service, according to its managers, are more linked to changes in the level of quality perceived by users. The proposal is to obtain dimensions and indicators to measure quality in service delivery and to enable the comparison between different services offered to the same target audience. This research is intended to assist public service managers by providing a mapping of dimensions and indicators that managers will be able to know, analyze and improve the services they provide and compare their strategies with those of other public institutions.

This work presents in its methodology quantitative research with a significant sample of information from the Brazilian public services. This survey was carried out in partnership with the Digital Government Secretariat of the Brazilian Ministry of Economy, which collected data from 289 services from 52 Brazilian public institutions. The methodology of this study was developed so that the metrics are universal, that is, applicable to any type of service in any country. The variables were developed in such a way that they could be classified into exhaustive and mutually exclusive categories, and thus allowing to identify where the responsibility for quality lies and how much each variable should be considered in the process of policy and service design.

This paper has been divided into five parts. Section 2 presents some works related to the evaluation of quality in the public and private sectors. Section 3 presents the methodology used to develop the proposed evaluation model, from conception to statistical validation of the collected data. Section 4 provides some considerations/discussions on the information analyzed. Finally, Section 5 presents the conclusions of the paper.

2. Quality in services

Quality management is seen as an effort to provide high quality services. In the private sector, there is a wide variety of techniques that organizations can choose to assess the quality of their service provision (Black, Briggs and Keogh, 2001). Using these techniques, the organization can be analyzed and evaluated on various characteristics, for example, leadership style, partnerships, strategy, and planning. Based on this analysis, service action plans can be designed to improve organizational aspects in which the organization has not performed well and thereby achieve better service delivery.

Public services face many challenges due to their differences from private services. While public services are operated by bureaucracy, private services are driven by market forces (Parker, Waller and Xu, 2013). For this reason, public services are less innovative than private services and more standardized. In fact, private services tend to be fast and dynamic as they have to respond to the external environment and competition.

For the public sector, service quality and customer satisfaction have been recognized since the 1990s as a critical strategic imperative for reinventing the sector. In the literature, however, most researchers directly adopt the five quality attributes based on the SERVQUAL model to measure the quality of public service (Bigné, Moliner and Sánchez-García, 2003; Brysland and Curry, 2001; Wisniewski, 2001). These five attributes are: reliability, tangibility, responsibility, security, and empathy. Each dimension can be considered more or less important depending on the type of service evaluated.

SERVQUAL is a quality model that is well known in the literature and has been used to measure the quality of the process in private services, where contact with people is important to provide a satisfactory service to customers (Parasuraman, Zeithaml, and Berry, 1988). Only few studies address other measures, such as equity and feedback, which are especially important in public services (Ra and

Park, 2001). In Rhee and Rha's work (2009) four main qualities of public service are identified: quality of process, quality of result, quality of project and quality of relationship. The findings suggest that the critical attributes of public service quality for customer satisfaction differ according to the type of customers in the public sector. The final customers (beneficiaries) prioritize the qualities of process and result, while the intermediate customers (social workers) have great consideration for the qualities of design and relationship.

Implementing operational and quality management in the public services means redesigning to answer questions such as improving productivity, reducing response times, reducing production costs, improving quality and meeting customer expectations. Bamford and Forrester (2010) argue that the goal of any service, retail and industrial public service, is to provide goods and services of a quality, quantity and availability that satisfy the needs of customers while enabling more effective use of resources. This statement classifies quality management as an integral part of operations management.

However, more intensive efforts are needed to improve the quality of services. Quantitative customer satisfaction surveys have a long history in the private sector. In some countries such as the United States, Canada and New Zealand, studies on citizens' satisfaction with public services are well consolidated (Lee, Hwang and Choi, 2012). In Latin America, initiatives such as Latinobarómetro or the World Bank's Doing Business report (2004), suggest that the quality and satisfaction of citizens with public transaction services is a problem. Latinobarómetro studies the overall satisfaction with central and local government services. Using a composite index that includes five central and six municipal services, the study finds that, on average, Latin Americans are dissatisfied with public services (5.1 points on a scale of 0 to 11).

Considering Latin America, the Simplifying Lives project (Pareja et. al., 2016) presents a new methodology to measure the quality with which services are managed and the satisfaction that citizens experience when receive them. The project was applied to six transactional services (procedures) in a pilot mode in the Caribbean and six Latin American countries: Chile, Ecuador, Panama, Paraguay, Trinidad and Tobago, and Uruguay. This project was the first time that measurement at the regional scale in Latin America was carried out. The results made it possible to identify specific areas for improvement, taking into account what citizens value most and what kind of projects to be implemented in each case. The project also made it possible to identify factors and dimensions internal to the service that allow assessing the quality of a service. These five factors and the respective analysis of variables are described in Figure 1.

The theoretical review of this work revealed that for the public sector there are still opportunities to develop new quality models and not just adopt private sector models. It is worth mentioning that due to the intangible nature of a service, there are several factors that can affect the perceived quality, both for the manager and the user. The Simplifying Lives project has shown the importance of developing a new evaluation methodology for public services that aggregates management information when assessing quality. This project also served as inspiration for the elaboration of the variables considered in this research work.

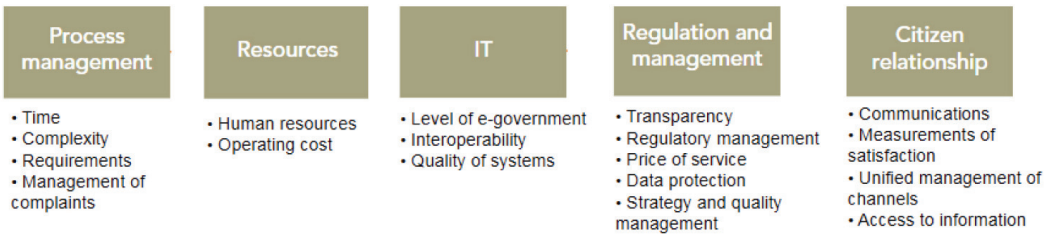

Figure 1. **Factors and variables of the internal evaluation model of the IDB model**

3. Research methodology

This work aims to identify which management processes and variables of the public institution influence the quality of services from the perspective of managers. For this purpose, the methodology was developed in several stages to incorporate the maximum possible response from the managers of the institutions that provide public services to the Brazilian federal government and this information is statistically significant for the development of a reliable evaluation model.

In short, our research methodology is divided into three phases:

– Phase I: Context design and data collection.
– Phase II: Statistical validation of the collected data.
– Phase III: Regression analysis.

This empirical study was conducted to find quality variables and develop a new conceptual model of service quality that can be applied to quality management in the public sector. The questionnaire-based model developed in phase I assumes that all analysed aspects of service management have some influence on one or more determinants of service quality. In phase II, a statistical validation and factor analysis of the data collected from the managers of Brazilian federal public institutions was carried out. Finally, in phase III, a regression analysis is performed to test the degree of importance of latent factors related to the quality of service from the managers' perspective.

The activities developed in each phase are presented in detail below.

3.1. Phase I: Context design and data collection

Initially, the Digital Government Secretariat of the Ministry of Economy developed a qualitative survey of an exploratory nature, using the focus group method, in order to elicit information, opinions, and suggestions with a group of managers of Brazilian public institutions on what public managers expect in terms of monitoring and evaluating their services. This survey was conducted in June 2018 with a group of 27 representatives from 7 institutions of the Brazilian Federal Government and aimed to identify the variables used in the composition of scale for evaluating of the perceived quality, which was later incorporated into the data collection instrument of this study. After the exploratory phase used to construct the data collection instrument, the present study was designed as descriptive quantitative research with a single cross-section of analysis.

However, before starting the quantitative research, a preliminary questionnaire was applied and subsequently improved, based on a pre-test conducted between 3 and 12 September 2018 with public service managers from 9 federal institutions, representing a total of 5% of the responses expected for the final survey. 68 comments and suggestions for improvement were received. Of the total suggestions, 88.88% were incorporated into the final version.

Table 1 shows the test questionnaire validated semantically after the initial pre-test. This questionnaire contains only 20 questions and the expected answers in each case. Some questions are dichotomous questions (yes or no), while others are affirmative questions, for which the Likert-4 scale was used, i.e.: totally agree, partially agree, partially disagree, totally disagree. The last question of the questionnaire in Table 1 refers to a score from 1 to 10 for the perception (opinion) of managers regarding the quality of service perceived by the users. This information was collected to be used in Phase III (regression analysis) in order to determine the relevance and importance of the factors in the managers' perception.

The questions in Table 1 are divided into four factors:

– Factor 1: questions T1 to T5 related to the systems of the service offered;
– Factor 2: questions R1 to R6 related to the human resources of the service;
– Factor 3: questions D1 to D3 related to the opinion of senior management (regulation) on the management procedures of the service;
– Factor 4: questions G1 to G5 related to quality management variables and the relationship with service users.

Table 1

Questionnaire developed for the collection of information in federal public institutions

ID	Question	Answer
T1	Systems facilitate day-to-day service management	Likert-4
T2	Systems provide reliable data and information	Likert-4
T3	Existing systems guarantee full support of the service provided	Likert-4
T4	Systems are reliable in terms of availability	Likert-4
T5	Systems meet accessibility requirements	Likert-4
R1	Employees receive training to provide the service as soon as they start their activities	Likert-4
R2	The current number of employees is adequate to provide the service	Likert-4
R3	The institution promotes the transfer of knowledge between employees	Likert-4
R4	There is a training policy for all employees	Likert-4
R5	Employees are selected based on the skills required to provide the service	Likert-4
R6	Are there people specifically responsible for quality assessment?	Sim/Não
D1	Top management assesses the coherence between the mission of the institution and the services it offers	Likert-4
D2	Top management monitors the quality standards of the services provided	Likert-4

ID	Question	Answer
D3	Top management promotes the improvements of management processes, with the aim of reducing requirements for service users	Likert-4
G1	Does the institution have a regular process for evaluating the quality of services provided?	Yes/No
G2	Is there a measurement of waiting time?	Yes/No
G3	Is there a tool for the users to assess their satisfaction with the service received?	Yes/No
G4	Are users involved in service improvement processes?	Yes/No
G5	Does your institution use complaints and suggestions to improve the service?	Yes/No
Score	At what level do you think users would rate the performance of the service in terms of quality?	1 a 10

Sources: Compiled by the authors (-hereinafter, unless otherwise noted).

The questionnaire in Table 1 was subjected to a quantitative survey with managers of federal institutions. In all, information was collected from 289 public services offered by 52 federal institutions. Among the 289 evaluated services, 53 services are provided exclusively to private individuals, 76 services are aimed at legal entities and 160 services are provided to both private individuals (individuals and legal entities).

3.2. Phase II: Statistical validation of the collected data

The quantitative research data from the previous phase were subjected to statistical and factorial analysis to verify the convergence and reliability of the information collected. Factor analysis helped to identify whether the categorical nature (factors) of the issues addressed is adequate and how these factors influence the perception of managers regarding the quality perceived by users.

Sample adequacy tests

Before proceeding with the factor analysis of the data, it is important to present some statistical information about the sample. Two statistical tests were used to analyze the adequacy of the sample collected: the KMO test (Kaiser – Meyer – Oklin) and Bartlett's test of sphericity. Table 2 shows the values obtained.

KMO test is a statistic that indicates the proportion of the data variance that can be considered common to all variables, that is, that can be attributed to a common factor. The closer to 1, the better the result, that is, the more adequate the sample is for the application of factor analysis. For the analyzed case, KMO value obtained shows that there is an average correlation between the variables.

Bartlett's test of sphericity can be defined as a statistic test used to examine the hypothesis that the variables are not correlated in the sample. When analyzing Bartlett's test of sphericity, a low sig value is observed, which would lead to the rejection of the correlation matrix being identity, for a significance level of 0.05, showing, therefore, that there is a correlation between some variables. In both cases, the tests evaluated suggest that the data are adequate for factor analysis.

Table 2

Statistical values used to measure the adequacy of the collected sample

Test		Valor
Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy		0,846
Bartlett's sphericity test	Approx. chi-square	2163,804
	gl	171
	Significant	,000

Factor analysis

The data collected were subjected to exploratory factor analysis to determine the underlying factor structure of the questions addressed in the quantitative research questionnaire, as shown in Table 1. Oblique rotation (Promax) was used and, given the exploratory nature of the study, the number of factors was determined by keeping all factors with eigenvalues greater than 1.0. This resulted in a solution with four factors (the same factors previously defined) explaining 59.61% of the variation.

The factorial loads for the four-factor solution can be seen in Table 3. Only loads greater than 0.40 are shown, since loads less than this value are not normally used in the analysis (Rossoni, Engelbert and Bellegard, 2016). The loads indicate that the questions of the same factor are, in fact, correlated since none of them presents a complex structure, that is, factorial loads above 0.40 in more than one factor. Through the factorial loads it is also possible to observe which issues have more influence on each factor: T1 and T2 for Factor 1, R1 for Factor 2, D1 for Factor 3 and G3 for Factor 4.

Table 3

Factor load of each variable and its most related component

ID	Component			
	Factor 1	Factor 2	Factor 3	Factor 4
T1	0,851			
T2	0,851			
T3	0,792			
T4	0,781			
T5	0,660			
R1		0,789		
R2		0,660		
R4		0,603		
R3		0,564		
R5		0,555		

ID	Component			
	Factor 1	Factor 2	Factor 3	Factor 4
R6		0,518		
D1			0,864	
D3			0,806	
D2			0,805	
G3				0,720
G2				0,705
G1				0,658
G5				0,525
G4				0,520

Table 4 presents the summary of the values obtained for the adjustment measures of the four-factor structural model given in Table 3. All adjustment values prove to be statistically adequate, making the four-factor solution sufficiently adjusted to the collected data.

Table 4

Adjustment measures of the 4-factor structural model obtained by factor analysis

Measure	Values obtained	Reference values
χ^2/gl – *Chi-square over degrees of freedom*	2,28	$2 < \chi^2/df \leq 3$ (Schermelleh-Engel and Moosbrugger, 2003)
CFI – Comparative Fit Index	0,909	>0,90 (Hu and Bentler, 1999)
RMSEA – Root Mean Square Error of Approximation	0,067	<0,10 (Hu and Bentler, 1999)
SRMR – Standardized Root Mean-Squared Residual	0,061	<0,10 (Worthington and Whittaker, 2006)

Validation of the measurement model

After the factor analysis and its adjustment, the convergent validity, the discriminant validity and the reliability of the factors obtained by the factor analysis were examined. Convergent validity indicates the degree to which the variables measure the same factor. To verify the convergent validity, the criterion proposed by (Fornell and Larcker, 1981) was used, which indicates convergent validation when the Average Extracted Variance – VME – is greater than 0.5. Table 5 shows in bold the VME values for each factor and all values are higher than the standard threshold, indicating the convergent validity for each factor.

Discriminant validation verifies the degree to which one factor is truly different from the others. This validation can be established when the VME for a given factor

is greater than the correlation between that factor and all others in the model (Fornell and Larcker, 1981). In fact, Table 5 shows that this criterion is met and, therefore, discriminant validity is established in the data collected. However, it should be noted that Factor 4 has a correction close to Factor 3. This could indicate that possibly some issues of Factor 4 could be semantically similar to the questions of Factor 3. Therefore, it is important to analyse the reliability of the factors.

Reliability indicates the degree of consistency between the items of a construction. To measure reliability, Cronbach's Alpha and Composite reliability are used. Composite reliability, must be greater than 0.70 to indicate internal factor consistency, and values greater than 0.60 are also accepted (Hair et. al., 2009). Table 5 shows that the composite reliability ranges from 0.631 to 0.891, confirming high internal consistency and good construction reliability.

Another criterion for determining reliability is the use of Cronbach's alpha. According to Nunnally (1978), reliability is demonstrated when Cronbach's alpha is at least 0.70 for exploratory measures. A review of Table 5 indicates that all factors meet this criterion, with values ranging from 0.742 to 0.884.

Table 5

Measures evaluated to validate the 4-factor structural model*

	Alpha Cronbach	Composite reliability	Inter-factors correlation			
			Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	0,873	0,891	***0,790***	-	-	-
Factor 2	0,742	0,786	0,527	***0,621***	-	-
Factor 3	0,884	0,865	0,506	0,345	***0,825***	-
Factor 4	0,765	0,631	0,346	0,432	0,759	***0,765***

Note: * The values of the average variation extracted are reported in bold on the correlation diagonal.

3.3. Phase III: Regression analysis

After the development and validation of the information in Phases I and II, linear regression was used to understand the impact of Factors 1, 2, 3 and 4 on the quality perceived by managers. The adopted regression model, given by Eq. 1 has as a dependent variable Q the score of the last question in the questionnaire in Table 1. The score of each factor refers to the average of the scores of the observed variables that constitute the factors.

$$Q = \beta_0 + Factor1 * \beta_1 + Factor2 * \beta_2 + Factor3 * \beta_3 + Factor4 * \beta_4 \qquad \text{Eq. 1}$$

The regression results in Table 6 show that Factors 1, 2 and 3 are significant predictors ($p < 0.05$) of t overall quality of the service. However, although Factor 4 did not present a value of $p < 0.05$, it should be considered that the sample size may have influenced the result. A new regression test was run with Factor 4 (non-significant) removed from the analysis and, in fact, no significant difference in the result was found.

Table 6

Values obtained by linear regression

Component	Beta coefficient	p-value
Factor 1	,123	,034
Factor 2	,152	,015
Factor 3	,351	,000
Factor 4	,046	,071
R^2	0,495	
Adjusted R^2	0,467	

The use of the four factors together explained 49% (that is, adjusted $R^2 = 0.467$) of the variation in service quality. Of the four factors analyzed, Factor 3 (related to top management's view of service quality planning and management) had the highest coefficient value in the regression, indicating the greatest relevance in the perception of quality.

4. Discussion

This work brings new significant contributions to the literature by proposing a causal model of public service quality from the internal perspective of the service. This contribution becomes significant as the collection of the evaluated data can be carried out directly by managers, without the need to use external sources.

The quality model in questionnaire format offers managers a direct way to measure the performance of their service. By presenting the statistical validity of the new instrument, this work has made the quality management process more effective and feasible, as managers have reliable information, validated in line with other public institutions, on the quality of the services they provide. These procedures will make it possible to structure and disseminate, at the three levels of the Brazilian public administration, a set of norms and references regarding regular research dedicated to assessing the quality of the public services.

However, a number of important limitations need to be considered. One of the criticisms of quantitative techniques is that, in an attempt to measure and compare attitudes and behaviors, much of the understanding and meaning is lost. In fact, questionnaires are a widely used tool, and while they allow for relatively simple administration of some form of feedback, they often fail to address issues of concern or support the development of a real understanding of the diversity of experiences.

Another limitation of the research developed is that there may be additional variables or alternatives to describe the concept of service quality based on internal variables that were not considered in this research. Finally, as mentioned earlier, the survey participants are civil servants working within the framework of public sector laws and under the requirements of an established quality assur-

ance system, which means that they know the basic concepts of quality. Therefore, future research can explore the view of service quality considering the level of knowledge of managers.

5. Final considerations

This work presented a questionnaire-based model for managers of public institutions to assess the quality of their services using internal variables, referring to service management. The development methodology includes quantitative research conducted with managers of 289 services offered by 52 Brazilian federal institutions. The statistical validation of the model based on this significant sample of information makes the model reliable in terms of perceived quality. Thus, public service managers can develop and test interventions to manage the quality of their services more effectively.

The model has 19 universal questions, applicable to any type of public service comprising four mutually exclusive latent factors: Systems, Human Resources, Regulation and Relationships. Statistically, these four factors have been shown to be reliable and highly relevant in the perception of quality. The literature also shows the relevance of these dimensions to quality management, both in the private and public sectors.

The study presented in this paper opens up future opportunities for investigation, for example: analyzing the relative importance of factors in predicting service quality, considering differences in organizational culture, type of service delivery (in person and / or digital) and type of service user (Individual and / or Legal Persons), in addition to testing new factors that, together with the four presented in this paper, could improve the quality assessment model of public services.

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