

# Quality Evaluation in Information Systems Outsourcing

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**Abstract:** The aim of this study is to assess quality perception of information system (IS) services outsourced by a large Brazilian bank, both from a technical (results) as well as from a functional (process, relationship) dimension. It is used the SERVPERF instrument from the SERVQUAL model, which has its structure assessed. SERVPERF is suitable for service quality evaluation. The results revealed unsatisfactory quality of the services outsourced, the structure of processes directed to the management of the client-supplier relationship is deficient, and the SERVQUAL model's structure requires modifications to improve its applicability to the IT outsourcing context.

**Keywords:** Information Systems, outsourcing, quality evaluation, SERVQUAL.

## 1. Introduction

IS outsourcing consists of transferring part of internal information technology (IT) activities from a contracting organization (client) to a contractor (seller, provider, supplier) through a contract. This process usually involves transference of production factors (people, facilities, equipment, technology, and other assets) related to this activity as well as the right to make decision over these factors [HL00]. The contractor, during

an established period of time, is paid to provide the contracting organization with IT assets and services and their management.

Global revenues from IT outsourcing were expected to increase from 2002 to 2005 from 154 billion to over 200 billion dollars, while in Europe from 43 billion to 72 billion Euros [Wi04]. These numbers reveal that IT outsourcing is a reality among organizations. Though, estimative indicates that half of outsourcing contracts in IT are unsuccessful [Be03]. One of the main reasons of low satisfaction with IT outsourcing is the inefficient management of client-supplier relationship [PA03].

Several studies have attempted to decompose inter-organizational relationships into processes [RV92; PS00]; some of them have approached IT outsourcing [LW04]. According to these studies, the management of the relationship between the client and its IT supplier can be seen from evolutionary perspective, in which four integrated macro-processes are established for a more collaborative interaction: *formation*, consisting of identification of outsourcing opportunities, strategy of outsourcing model and selected supplier; *management*, following the everyday of outsourcing; *performance evaluation*, accessing the relationship in terms of efficiency (technical and economic aspects), and effectiveness (reliability, commitment, cooperation, synergy); and *evolution or end* of the relationship, based on results provided by performance evaluation. The quality of the client-supplier relationship in IT outsourcing will depend on the quality of these four integrated macro-processes.

Within the context of the performance evaluation process in IT services provided by a supplier, this study seeks to identify situations that impact on client satisfaction with the quality of these services. Based on 22 items distributed in five dimensions – tangibles, reliability, responsiveness, assurance, and empathy – the SERVQUAL is the evaluation model to be applied in this study to assess service quality [BZP90]. Structure stability of this model has been the subject of analysis in the IT field [VPK97; Ca02], and it is also one of the objectives of this study.

Due to its high automation level, the Brazilian banking sector is particular interesting for the applicability of SERVQUAL. In 2004, this sector invested around 1.83 billion dollars in IT, being around 750 million dollars in information systems development [FE05]. The bank participating in this study figures among the five Brazilian banks with the largest IT investments (over 435 million dollars in 2005).

Besides introduction, this article was developed according to the following sections: presentation of the SERVQUAL model, its characteristics and criticisms; research methodology; results; and final considerations.

## **2. The SERVQUAL Model**

The SERVQUAL model evaluates service quality through two instruments, each one containing 22 objective items distributed in five dimensions (see Table 1).

Table 1 – The five dimensions of service quality

Dimensions	Definition	Number of Items
Tangibles (TANG)	Appearance of physical facilities, equipment, personnel, and communication material.	4
Reliability (REL)	Ability to meet schedule and provide the reliable and accurate service.	5
Responsiveness (RESP)	Willingness to help consumers and provide prompt service.	4
Assurance (ASSU)	Knowledgeable and polite personnel with ability to generate trust and confidence.	4
Empathy (EMP)	Caring and individualized attention to clients.	5
Total		22

Source: Adapted from [BZP90].

The first instrument – SERVEXP - was designed to assess client and supplier expectations of the service provided, whereas the second one – SERVPERF - aims at evaluating client and supplier performance perception of service. The expectations related to service quality are considered as client needs or wishes, that is, what the service supplier *could* provide [Pa88]. Performance perception of service quality, however, refers to the service that was *actually performed* [BZP90], when client directly interacts with the service [BBM00]. Service quality perception grows out of an evaluative perception of the client during service provision, in a specific moment in time [CT94].

## 2.1 Gap Analysis

The algebraic difference between performance perception evaluation (P) and expectation evaluation (E) of service(s) for each respondent, in each item of each dimension, characterizes the gap ( $G = P - E$ ) of service quality, which may represent a service quality above or below expectations. A zero gap score for a given item represents that client and supplier have the same perception for this item. A positive score means that client feels satisfied with the quality of the service provided [Ji00].

Additionally, the SERVQUAL may be concomitantly applied under client's perspective as well as under supplier's perspective. In this case, expectations and perceptions gaps should be considered. When only a single instrument is employed - SERVEXP or SERVPERF - there will be only one type of gap to be analyzed between clients and suppliers' respondents – expectations or perceptions.

## **2.2 Criticisms and Recommendations**

While being widely accepted, the SERVQUAL model has also received criticism. Operationalization of service quality perceived as a gap score [CT92], ambiguity of the construct of expectations [Te93], and factor structure instability from sample to sample [PWK95; KWL99] are among restrictive aspects of the model. However, the SERVQUAL remains as the first effort in marketing to measure service quality [KWL99].

Parasuraman *et al.* (1988), the authors of the model, claim that it provides basic structure that sustains service quality. They also state that the model is open to receive slight word modifications and extra items related to specific contexts in order to become aligned with specific needs. In this sense, the debate on the psychometric properties of SERVQUAL in the IS research [PWK95; KWL99; Ca02] has generated variations from its original version.

The SERVPERF instrument is considered more suitable than the SERVEXP, since this one doesn't have superior psychometric properties as those of the first [VPK97]. Besides this, the superiority of the SERVPERF was confirmed in the long term with cross-sectional studies, which aren't limited with actual experiences of the client [CT92; CT94].

## **3. Methodology**

The exploratory survey was conducted in a large Brazilian retail bank (assets over 70 billion euros and activities in five continents) with an intense use of IT. Its IT department (ITD) is responsible for the bank automation, outsourcing part of the IS development to an organization that provides this service, through a relationship that has lasted for more than 8 years. This relationship is the focus of this study.

There were three types of outsourcing models adopted: a) body shop – there are supplier's employees working with and managed by the ITD development staff; b) software factory – in which the supplier uses its own environment to develop the code specified by the client; and c) bank of hours – when an amount of hours is hired from the supplier to develop specific projects, being this one responsible for managing its resources (human and physical) in its own facilities.

### **3.1 Respondents**

The survey respondents were the ITD employees (clients) and the supplier's employees who currently provide services for the ITD. The respondents should have middle management or technical profile (systems analyst, programmer), since these profiles represent a higher level of experience in the client-supplier relationship with regard to

the outsourcing being studied. A total of 757 ITD respondents and 370 supplier's respondents were selected.

### **3.2 Survey Instrument**

The survey instrument was adapted for outsourcing services in the banking area. It was based on the version of the SERVPERF instrument applied to IS services [PWK95], since the supplier had been providing services for the client for a long time. Therefore, the employees were able to show their perceptions based on their accumulated experience. The instrument was adapted by one of the researchers, considering his professional experience in IT services, mainly in the context of the ITD relationship with the IS supplier.

In this adaptation, the four items of the tangibles construct were replaced by seven items, six of which were taken from the instrument used to assess the quality of IS development by final users [RPR97]. It had its origin in the recommendations of the ISO/IEC 9126-1 norm [In91], being selected aspects of functionality, maintainability, performance, usability, testability and understanding of the code in IS, according to the context of the existing client-supplier relationship. The seventh item inserted aimed to verify if the supplier has met the IS development standards defined by the ITD.

With the aim to obtain the face validation, a pilot test was applied to four ITD employees. As a consequence, some items were slightly modified for better understanding. One item of the responsiveness construct (the supplier's employees are always willing to help) was excluded, due to redundancy in relation to another item of the same construct (the supplier's employees solve all questions and doubts even when they are busy). The Likert scale of the instrument was increased from five to seven points (1 = strongly disagree to 7 = strongly agree), aiming at more comfort in the responses. The more points that respondents have available the more precise will be the measure of the perception evaluation regarding agreement or disagreement [HA98].

The survey instrument used had 24 items, 2 more than the original SERVPERF instrument. Furthermore, an open-ended item was included for the respondents' considerations on the SERVPERF items; and two demographic items were also included – one about the time working for the ITD or for the supplier and the other related with the role profile. The results of the Cronbach's alpha (see Table 5) show that the internal consistency of the scale was maintained [HA98], thus assuring the reliability of the instrument. The survey operationalization was conducted by e-mail.

### **3.3 Characterization of Data Collection and Analysis**

Data collection was performed according to the following standard procedures for this type of survey [HA98]. Data was collected by e-mail from potential respondents selected from databases, between April 6<sup>th</sup>, 2005 and April 15<sup>th</sup>, 2005. The answers were obtained

from 104 ITD employees (13.7% out of 757) and 40 supplier's employees (11% out of 365).

In order to achieve the objectives of the survey - to evaluate satisfaction with IT services quality and the model's stability (convergent and discriminant) – data factor structure was checked by using techniques of first and second generation of multivariate data analysis, i.e., exploratory factor analysis (EFA), and confirmatory factor analysis (CFA).

Before the multivariate analysis was conducted, data dimensionality was checked - graphical examination of data, analysis of missing data (omitted values), identification of *outliers* and test for statistical assumptions of multivariate analysis. Dimensionality was considered adequate. A qualitative analysis was also performed to identify categories related to the quality of the services provided.

## 4. Results

This section presents the results obtained following exploratory factor analysis represented by the rotated factor matrix and by the index of construct reliability; confirmatory factor analysis represented by the resulting factor loads and by the adjustment indices for the measurement model; and average analysis of perceived quality levels and resulting gaps. The software used were SPSS® (for EFA) and AMOS® (for CFA).

### 4.1 Sample Characterization

Tables 2 and 3 present the respondents' characterization. Table 2 highlights the fact that 47.6% of ITD employees have worked for 4 to 6 years in this department, whereas 41% of the supplier's employees have worked up to 3 years. Table 3 identifies the fact that most ITD and supplier's respondents hold a technical position.

Table 2 – Working time of respondents (%)

	Up to 3 years	4 to 6 years	7 to 10 years	+ 10 years	
ITD	26.2	47.6	23.3	2.9	100.00
Supplier	41.0	36.0	20.5	2.5	100.00

Table 3 – Job position profile of respondents (%)

	Middle Management	Technical	
ITD	33.0	67.0	100.00
Supplier	10.3	89.7	100.00

## 4.2 Construct Validation

The EFA was performed with the aim of examining underlying patterns of variables without the influence of the researcher [HA98], by verifying the grouping of the scale items, thus obtaining a preview of what could be expected from the CFA. The results of this analysis are presented in Table 4, in which we analysed the rotated factor matrix (the three factors represent 69.01% of the extracted variance) and Bartlett's sphericity test (3199.75;  $p < 0.000$ ), besides using the principal axis factoring and varimax rotation as the extraction method for this analysis.

Table 4 – Correlation matrix among factors

	FACTOR 1	FACTOR 2	FACTOR 3
EMP 4	0.789		
EMP 3	0.766		
ASSU 1	0.704		
EMP 5	0.695		
RESP 3	0.695		
EMP 1	0.669		
EMP 2	0.662		
ASSU 3	0.640		
ASSU 4	0.635		
ASSU 2	0.624		
REL 2	0.580		
RESP 4	0.546		
TANG 2		0.779	
TANG 3		0.770	
TANG 1		0.732	
TANG 7		0.673	
TANG 4		0.627	
TANG 5		0.598	
TANG 6		0.582	
REL 4			0.798
REL 1			0.776
RESP 1			0.705
REL 3			0.558
REL 5			0.545

The EFA did not confirm the constructs, as predicted by SERVQUAL. However, when the reliability of such constructs was evaluated, quite favourable results (see Table 5) were found, since the minimum limit considered for the acceptance of Cronbach's alpha was 0.70 [HA98]. Since the factor structure predicted in the literature was not confirmed, we decided to perform the CFA. Besides being particularly useful to validate measurement scales for specific constructs [HA98], this scale allows the examination of the relationship among factors free from measurement errors as well as their estimate and removal [UI01]. The objective of the CFA is to measure the degree in which the data obtained by the survey respond to the expected model through statistical significance. Based on the verification of the model adjustment to the data, reliability (composite

reliability and extracted variance) and construct validity (convergent and discriminant) can be evaluated.

Table 5 – Construct reliability indices

Factors	TANG	REL	RESP.	ASSU.	EMP.
Cronbach's Alpha( $\alpha$ )	0.94	0.88	0.84	0.93	0.90

The indices of model adjustment are presented in Table 6. The most used index has been the chi-square statistic ( $\chi^2$ ), both in an absolute form followed by the respective statistical test and the  $\chi^2$  ratio divided by the degrees of freedom (in this case, a parsimony adjustment measurement). This ratio is acceptable for values under 3 [K198]. For the present model, the relationship chi-square ( $\chi^2$ )/GL was quite satisfactory (2.20), indicating that the estimated matrix corresponded well to the observed matrix.

The other indices have magnitudes close to the values considered acceptable for models. However, the index used to measure errors was low (0.09). Therefore, the proposed measurement model is considered accepted to measure service quality, which allows moving on to construct validation.

Table 6 - Indices of the measurement model adjustment

Goodness-for-fit Indices	Desired parameters [K198; HA98]	Obtained values
$\chi^2$	-	430.50
GL	-	196
$\chi^2$ /GL	< 3	2.20
GFI	High values (~1)	0.79
NFI	> 0.90	0.87
TLI	> 0.90	0.90
CFI	> 0.90	0.92
RMSEA	< 0.10	0.09

The convergent validity of a construct can be verified by checking the factor loads of the items that are part of the construct. A construct that presents high ( $\beta > 0.5$ ) and significant factor loads ( $p < 0.000$ ) has a convergent validity [SV91]. All constructs presented convergent validity.

The results found in the confirmatory factor analysis corroborated what was seen in the exploratory factor analysis: the dimensions tangibles, reliability, assurance, empathy and responsiveness do not have discriminant validity. Nevertheless, the measurements of composite reliability and extracted variance indicate that the scale is valid and reliable. Composite reliabilities over 0.70 and extracted variances over 0.50 are considered acceptable. The only reservation to be made is that the results found in the surveyed sample did not allow us to verify the discriminant validity.



### 4.3 Analysis of Gap Scores

Table 7 presents the gap scores for the 24 items used in the SERVPREF instrument. All of them presented negative values, which means an unsatisfactory performance (inadequate) concerning service quality.

Table 7 – Client versus supplier perceptions and resulting gaps

Factor	Items	Gap
Tangibles (TANG)	01. The applications (software, systems) developed by the supplier meet the application development standards of ITD.	-1.43
	02. The applications developed by the supplier meet the functional specifications presented by ITD.	-1.19
	03. The applications developed by the supplier allow flexibility/readiness for future maintenance.	-1.52
	04. The application developed by the supplier use the computational resources (computer, database, files) efficiently.	-1.33
	05. The operation of the applications developed by the supplier is characterized as user-friendly.	-0.93
	06. The applications developed by the supplier allow to easily perform the necessary tests to verify whether functional requisites have been met.	-0.86
	07. It is easy to understand what the application developed by the supplier makes, through its development structure and modularisation.	-0.94
Reliability (REL)	08. When the supplier promises to do something for a period of time, it is actually done.	-1.56
	09. When you have a problem or a necessity that is the supplier's responsibility, a real interest in solving them is demonstrated.	-0.89
	10. When the supplier's service is concluded/delivered there is <u>no</u> need of corrective maintenance.	-1.14
	11. The supplier delivers its services at the due date, i.e., with no delays.	-1.08
	12. The supplier is known for generating information without errors.	-0.96
Responsiv. (RESP)	13. The supplier's employees tell you exactly when the services will be performed, i.e., the deadline.	-1.29
	14. If you have an urgent need, it is immediately addressed by the supplier's employees.	-0.93
	15. The supplier's employees resolve your questions and doubts at the appropriate time, even if they are busy.	-0.51
Assurance (ASSU)	16. The behaviour shown by the supplier's employees inspires trust in you.	-0.90
	17. You feel safe when relating to the supplier.	-0.96
	18. The supplier's employees are always assured when responding to your questions.	-0.89
	19. The supplier's employees have the required knowledge to resolve your questions and doubts.	-1.24
Empathy (EMP)	20. The supplier gives individualized attention to you.	-0.59
	21. The supplier provides services at convenient schedules to you.	-0.60
	22. The supplier has employees who give proper attention to your needs.	-0.97
	23. The supplier shows real importance to essential needs presented by you.	-0.74
	24. The supplier's employees understand the specific needs presented by you.	-1.24

When the gap scores were calculated by dimension, the ones that caused more dissatisfaction in decreasing order (from more to less satisfaction) were reliability, (-1,4), tangibles (-1.17), assurance (-0.9975), responsiveness (-0.91) and empathy (-0.828). Since these scores were obtained from a majority of respondents with a working time above four years, besides a profile mainly technical one, the overall dissatisfaction is a challenging interest for practical considerations.

In this sense, aiming to identify the cause of such dissatisfaction with the services provided, we proceeded to the content analysis of the answers presented in the open-ended item (make the comments you consider pertinent about the quality of services provided by the supplier), according to recommendations [Si01] for the categorization of answer standard frequencies. Five categories related to ITD employees' dissatisfaction (client) were identified, according to Table 8, in which their characteristics are listed. These categories highlight the importance of reviewing the processes of client-supplier relationship management.

Table 8 – Categorization of dissatisfaction quotations by the client

Categories	Characteristics
Technical competence	Heterogeneous, related to factors such as the inexistence of abundant resources in the market, failure in the recruiting process and high turnover. This is a consequence of personnel policy that does not encourage the retention of good employees by the supplier.
Relationship methodology	Lack of methods that make what is being specified clear to the supplier, the standard to be followed by the supplier and how the service should be received, including acceptance tests.
Outsourcing model	Body shop productivity is higher, considering the close follow-up by the ITD employees at the time the service performed by a software factory was criticized, considering the inexistence of a methodology adequate to the service interactions.
Commitment	Inexistent in the supplier's employees, both with regard to the services developed and to the ITD needs, although there were answers that did not allow generalizing these aspects to all supplier employees.
Payment Term	Use of pricing per worked hour, instead of by goals or deadlines. Even if it presents a relation with the category outsourcing model, it also correlates to the category commitment, once it does not encourage commitment.

Concerning these results, it is worth to mention that the ITD aims to develop an evaluation instrument based on relationship, and integrating the management practice recommendations by CMMI® (Capability Maturity Model Integration) and SEI (Software Engineering Institute) disciplines – systems engineering; software engineering; integrated product and process development; and supplier sourcing – and by RUP® (Rational Unified Process) and IBM® disciplines - requirements, analysis & design, implementation, test and deployment.

## 5. Final Considerations

The SERVQUAL model was used to assess how the bank's ITD evaluates IS outsourcing service quality. Moreover, it was possible to continue the evaluation of the model itself, since studies indicate instability in its factor structure, as well as collecting information that can help the enhancement of IT governance, through practices that aim at the success of IS outsourcing.

The SERVQUAL model applied to this survey has not confirmed the distribution of expected factor loads (the five constructs defined in theory), but the reliability of these constructs (Cronbach's alpha), the composite reliability and the extracted variance allowed us to verify the pertinence of the SERVQUAL model to assess the IS outsourcing service quality in this study. However, improvements to its structure should be identified, aiming at its structural stability.

It is worth to highlight the cohesion of the tangibles construct, whose original items were completely replaced by seven items containing a more appropriate content with regard to the existing interaction between the client and the supplier. This result stresses a contribution to the technical dimension – tangibles construct – of the SERVQUAL model in the assessment of IS outsourcing quality.

The content analysis made about the answers to the open question allowed a complementary evaluation of the perceptions obtained by SERVPERF. Technical competence, relationship methodology, outsourcing model, commitment and payment term seem to be the categories to which the ITD dissatisfaction is directed with regard to IS outsourcing. The managerial reflection on these categories allows the evolution of management practices focused on the improvement of IT governance, mainly under a process perspective in order to favour a more collaborative relationship.

The limitation of this study lies in the fact that five original factors of the SERVQUAL model were not identified, despite the validity of its use to assess the IS outsourced service quality by the ITD. As a consequence, there is the opportunity to continue studying the assessment model for the IS outsourcing client-supplier relationship in sectors like banks, characterized by the great demand of IS development as a form of competitive advantage.

Future research is planned to study how can be established satisfaction in IS outsourcing. It will be applied theoretical perspectives like transaction costs [Wi75], relational contract [Ma78], resource dependence [PS78], and social exchange [Em72], that in part are related to the six categories identified in the present study. Cooperation, trust, and commitment in a client-supplier relationship seem to be influenced by economic, technical resources, and social dimensions, according to the expanded theory of commitment-trust [Mo00].

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