



Service quality perceptions in higher education institutions: the case of a colombian university

Madeline Melchor Cardona ^{a*} y Juan José Bravo ^b

^aProfesora, Facultad de Ciencias Económicas y Administrativas, Universidad Autónoma de Occidente, Cali, Colombia

^bProfesor, Escuela de Ingeniería Industrial, Universidad del Valle, Cali, Colombia

INFORMACIÓN DEL ARTÍCULO

Historia del artículo:

Recibido el 26 de abril del 2011

Aceptado el 13 de diciembre del 2012

JEL classification:

M31

Keywords:

Higher education
Student satisfaction
Service quality
Quality factors

Clasificación JEL:

M31

Palabras clave:

Educación superior
Satisfacción del estudiante
Calidad de servicio
Factores de calidad

Classificação JEL:

M31

Palavras-chave:

Educação superior
Satisfação dos estudantes
Qualidade de serviço
Factores de qualidade

ABSTRACT

Recognizing that higher education institutions (HEI) are currently competing aggressively through competitive advantages and high service quality, the assessment of the service quality is essential to provide information on the effectiveness of educational plans and improvement programs. This article presents a study which tests the 5Q's model proposed by Zineldin (2007), and examines the service quality factors that most impact on student satisfaction. Factor analysis and regression analysis showed significant variables in explaining student satisfaction as: trust developed toward the university and the academic program, and the perception they have of assessment techniques as a challenge to improve intellectual growth.

© 2012 Universidad ICESI. Publicado por Elsevier España. All rights reserved.

Percepciones sobre la calidad del servicio en instituciones de educación superior: el caso de una universidad colombiana

RESUMEN

Reconociendo que las Instituciones de Educación Superior (IES) compiten a través de ventajas competitivas y alta calidad de los servicios, la evaluación de la calidad del servicio es indispensable para proveer información sobre la eficacia de los planes educativos y los programas de mejoramiento. Este artículo presenta un estudio soportado en el modelo 5Q's propuesto por Zineldin (2007) para la medición de la calidad del servicio en las IES y explora los factores que más impactan en la satisfacción del estudiante. El análisis factorial y el análisis de regresión muestran cómo variables significativas en la explicación de la satisfacción del estudiante, a la confianza sentida hacia la universidad y el programa académico y a la percepción sobre las técnicas de evaluación como un reto para aumentar su conocimiento.

© 2012 Universidad ICESI. Publicado por Elsevier España. Todos los derechos reservados.

Percepções da qualidade de serviço em instituições de ensino superior: o caso de uma universidade colombiana

RESUMO

Reconhecendo que actualmente as instituições de ensino superior (IES) competem agressivamente através de vantagens competitivas e serviço de alta qualidade, a avaliação da qualidade de serviço é essencial para fornecer informação na eficácia dos planos educacionais e programas melhorados. Este artigo apresenta um estudo que testa o modelo 5Q's proposto por Zineldin (2007) e explora os fatores de qualidade de serviço que têm maior impacto na satisfação dos estudantes. A análise de fator e a análise de regressão mostram variáveis significativas na explicação da satisfação dos estudantes como: um fundo desenvolvido em prol da universidade e do programa acadêmico, e a percepção que têm das técnicas de avaliação como um desafio para melhorar o crescimento intelectual.

© 2012 Universidad ICESI. Publicado por Elsevier España. Todos los derechos reservados.

* Autor para correspondencia: Calle 25 N.° 115-85, Km 2. Vía Cali, Jamundí, Colombia.

Correo electrónico: mmelchor@uao.edu.co (M. Melchor Cardona).

1. Introduction

Harvey in 2001 (p.4) stated that "institution-wide student feedback about the quality of their total educational experience is an area of growing activity in higher education institutions around the world". Today that statement remains valid and increases in importance, and the search of students' overall satisfaction has been a research focus of numerous studies (Postema and Markham, 2002; Tan and Kek, 2004; Lounsbury, Saudargas, Gibson, y Leong, 2005; Jurkowitsch, Vignali and Kaufmann, 2006; Zineldin, 2007).

Higher Education Institutions require information on the quality of academic and administrative services they provide, allowing them to set priorities for resource allocation, and to strengthen marketing and promotion plans. Observing students as primary consumers of educational services (Hill, 1995; Darlston-Jones, Pike, Cohen, Young, Haunold and Drew, 2003; Lee and Tai, 2008), it is legitimate to ask them, in a systematic (methodical) and rigorous way, how satisfied they feel with the academic and administrative services they receive.

Today it is necessary to find strategies to strengthen their competitiveness by providing a high quality educational service, always seeking differentiation from other public or private institutions (Hayes, 2007). In fact, every institution has two particularly important processes which are highly dependent on the marketing strategy used. First, the process of recruitment of high quality students at the start of their college career, and second, the process of retention of these students within the university campus until the end of their career.

Student retention is often associated with loyalty to the institution (Hennig-Thurau, Langer and Hansen, 2001), and also relates to the satisfaction with service experience. Brown and Mazzarol (2009) argued that if students have a good image of the university it is probable that they are satisfied with the institution and therefore their level of loyalty will be high. Retention, moreover, is associated with the concept of persistence, and in this way Demaris and Kritsonis (2008) assumed that students' overall satisfaction with the learning experience is an indicator of college persistence.

We can say that service quality is a key driver of marketing strategies effectiveness in higher education institutions and is highly related to student satisfaction. Actually, service quality may bring about favorable or unfavorable attitudes of students towards the institution (agreeing with Zeithaml, Berry and Parasuraman, 1996, when analyzing the service impacts) and may influence "Word-of-Mouth Marketing".

In the measurement of service quality, the SERVQUAL instrument (Parasuraman, Zeithaml and Berry, 1985, 1988, 1994) has been highlighted by its wide applicability. The SERVQUAL undertakes to measure service quality across five dimensions, which from the perspective of higher education are (Yeo, 2009; Oliveira and Ferreira, 2009): (1) Tangibility: physical facilities, equipment and appearance of university staff. (2) Reliability: the ability to perform the promised service dependably and accurately. (3) Responsiveness: the willingness to help students and provide prompt advice and service. (4) Security: the ability of university staff to demonstrate competence, confidence, courtesy, credibility and security. (5) Empathy: the ability to care and provide individualized attention to students. Considering these dimensions of quality, service quality is determined as the difference between student expectations and perceptions of service delivery quality. In general, consumers are dissatisfied only if the experienced quality is worse than expected (Parasuraman, Zeithaml y Berry, 1988).

Hill (1995) was among the first to use SERVQUAL to measure the quality of university services, and recognized the difficulty of measuring expectations for students. Hill claims that many students do not even know what expectations they have, or which expectations they had about the service provided. This difficulty was encountered in Cronin and Taylor (1992) for all types of services, and they

proposed the SERPERF instrument to focus studies only on perceptions. Despite the difficulty of measuring expectations, there is no doubt about their importance as indicated by Hill (1995), Darlston-Jones, Pike, Cohen, Young, Haunold y Drew (2003) and Pichardo, García, De la Fuente and Justicia (2007), among others.

On the importance of perceptions, Zineldin (2007) stated that the measurement of students' perceptions about the quality of service offered by a university can reflect the level of overall student satisfaction within the institution. He focused his proposal on the perceptions measurement of five quality dimensions named: object quality, process quality, infrastructure quality, interaction and communication quality, and atmosphere quality (5Qs model).

Based on the foregoing, an empirical study, in a private institution, was conducted to explore the factors that have a great impact on students' satisfaction in higher education, focusing on perceptions of service quality factors (which are controllable by the institution) identified by Zineldin (2006, 2007) in his 5Qs model. This paper begins with a review of the relevant literature on similar studies, followed by a description of the 5Qs model. Subsequently, research methods and results are presented and discussed in the light of the current theory. Finally, we provide conclusions and remarks for future work.

2. Literature Review

2.1 Service Quality Measurement in Higher Education.

Despite the numerous studies which have been made on service quality in higher education institutions, in this paper we will give a brief summary of some of the work.

Hill (1995) shows an interesting study where he presents the expectations and perceptions about university service of a cohort of undergraduate students in a United Kingdom university. Hill concluded about stability of students' expectations during the time of their university experience and suggested that they were probably formed prior to arrival at the university. In addition, students' perceptions of service experienced proved less stable over time. He proposed to measure the students' expectations before they enter a university and not during their stay. Brenders, Hope and Ninnan (1999) also found appropriate to measure expectations only at the beginning of the university studies, taking into account that at that point expectations are at best vague and based on unrealistic comparisons with high school experiences. By considering these conclusions and according to what was discussed before, we have focused our research on perceptions.

With respect to how many quality dimensions are to be measured from students' perspective, Owlia and Aspinwall (1996) proposed six quality dimensions in higher education: tangibility (adequate equipment and facilities), competence (teaching expertise, practical and theoretical knowledge), attitude (understanding students' needs, courtesy, personal attention, willingness to help, etc.), content (practical relevance of curriculum, being cross-disciplinary, flexibility of knowledge, etc.), delivery (effective presentation, feedback from students, encouraging students, etc), reliability (trustworthiness, handling complaints, solving problems). These dimensions are highly related to teacher-student relationship and do not consider explicitly other features of the university campus especially the communication process (among the actors involved in the university environment) and administrative support. Despite this, some institutions consider this framework appropriate for measuring the quality of university service (Mishra 2007).

Wright (1996) applies Factor Analysis to identify factors associated with students' perceptions of service quality at a university, based on the framework of the SERVQUAL model. He worked with 31 items on a questionnaire which was built in conjunction with students, graduates, teachers and principals. The sample of 149 was applied to

third-year business students. The factors of greatest impact were the following: (1) diversity of the educational experience: diversity of courses and student body; (2) ease of access and use of facilities: location and environment; (3) personalized interaction: interaction between students and teachers; (4) student quality: average scores of students accepted; (5) educational process: specific requirements and ability to meet these requirements; (6) faculty quality: academic and professional training of teachers; (7) computing facilities: technological capabilities of the university; and (8) professors' teaching experience. Again, the factors or dimensions do not include communication issues and administrative support, and are almost totally based upon teacher-student relationship.

Cook (1997) shows a study that was performed on a group of nursing students, in a global sample of 182 students from a British university. The students identified the following factors as drivers of a good quality: a) academic staff factors, b) study factors (library and private study facilities, computer access, and an atmosphere conducive to study), c) general welfare factors, d) practice factors, and e) extra-curricular activity factors. He concluded that the most representative factor that influences the service perception is the interaction between academic staff and students, and did not mention explicitly the importance in the way the administrative staff communicates with students and teachers.

Berger and Milem (1999) studied the factors influencing the persistence of undergraduate students at a private institution in the Netherlands in a sample of 718 students. They had a special emphasis on social and academic integration of students and they concluded that those students who have a more successful integration are influenced by their home background (factors which are less controllable by the institution).

Meanwhile, Brenders, Hope y Ninnan (1999) conducted a study in an Australian university through the focus group methodology, in which they interviewed 145 undergraduate students. They focused their research on the students' perceptions about university services, and on the successes and obstacles perceived by them during their university experience, excluding the academic experience. They found that the bureaucratic issues and the misuse of communications are factors that negatively influence student perception of university service quality.

Tan and Kek (2004) presented a study which examined the students' overall satisfaction in the engineering faculty of two universities in Singapore. A questionnaire was built based on the SERVQUAL instrument, and there were 958 usable returns (497 from University A, and 461 from University B) which served for comparison purposes. The results showed that students at both universities expected a higher service level with regards to the availability of channels for conveying their ideas to management and the willingness of the universities to consider their opinions (communication problems).

Walter (2006) showed a complete study which determines the factors associated with of students' loyalty and satisfaction in the business program at the Catholic University of Parana, Brazil. The study argued that a number of uncontrollable variables exist which influence the levels of satisfaction, such as the economic level of student and family, employment status and marital status.

Mostafa (2007) presented a technical study based on a sample of 508 students from four private universities in Egypt, using the SERVQUAL tool combined with Importance-Performance (IP) analysis for measuring service quality. His approach is highly focused on the students' perceptions and he performed a factor analysis in which he concluded that the five dimensions proposed by the SERVQUAL instrument are not met. Instead, he obtained three factors or quality dimensions: (1) actual service-oriented procedures associated with student registration, fee payment, and enrolment, (2) university's staff and their service orientation toward the student body, (3) physical evidence and the importance of the physical service environment.

Oliveira and Ferreira (2009) proposed the more recent adaptation of the SERVQUAL scale's generic questionnaire for the higher education service sector and presented the main results of its application to students of the production engineering program at São Paulo State University, Brazil. 38 questionnaires were applied to measure entering students' expectations and 28 to measure graduating students' perceptions. They did not validate the SERVQUAL dimensions as Mostafa (2007) did, and applied the resulting instrument with seemingly satisfactory results. Other interesting studies are Brown and Mazzarol (2009), Yeo (2009), Lee and Tai (2008), Jurkowsch, Vignali y Kaufmann (2006), among others.

In the articles which have been investigated, we have found some coincidences of quality dimensions or quality (macro) factors but there is still a broad diversity of seemingly independent findings, which do not allow defining the quality framework in higher education comprising a unique group of main factors. 5Qs model (Zineldin 2006, 2007) intends to fit the quality dimensions into five groups, and we tested the pertinence of this proposed framework in a private Colombian university.

2.2 5Qs Model

It is a common concern of the need for comparative purposes, to identify a set of generic questions or a generic framework that can be used to gauge satisfaction with institutional provisions and programs of study. It is not easy, as we will see in next section, to build a generic questionnaire because of the particular interests of the actors involved inside each institution. But, from a systemic point of view, it is quite possible to define the names of the (macro) internal factors which are to be involved in the students' satisfaction. Zineldin (2007) proposed a framework to measure satisfaction in higher education institutions which comprises five quality dimensions:

- Q1. Quality of the object (education or research itself): quality in the academic program and course content, relevant and up to date contents. It measures the education itself, the main reason of why students are studying at a university.
- Q2. Quality of the Process: how to deliver the object (lectures, seminars, individuality, flexibility, creativity, filed work, exam forms, etc). It measures how well educational activities are implemented.
- Q3. Quality of infrastructure: measures the basic resources which are needed to perform the educational services: technical and human resources, technology, know-how, relationships, internal activities and how these activities are managed, co-operated and coordinated.
- Q4. Quality of interaction and communication: between students and the university and vice versa, between staff and students, among staff, etc. It measures the ability for the institution to manage and meet the students' needs as well as the accessibility to permanent, current and timely information.
- Q5: Quality of the atmosphere: trust, security, high projection and positioning that reflect the institution as a whole.

This model is based on factors controllable by the institution, and includes factors that are not explicitly present in the adaptation of the SERVQUAL instrument made by Oliveira and Ferreira (2009) and Mostafa (2007). Here, we refer to factors named as Q1 and Q2, which are defined in a more explicit way in the 5Qs model.

5Qs model is concentrated on perceptions (instead of the perceptions-expectations approach) and also includes a component of accomplishments, with questions related to aspects that would enhance student satisfaction, trust and positive recommendation intention.

It consists of two integrated components. One component measures the level of student satisfaction (SS), another measures the

perception of students in the dimensions of quality (5QS) which are assumed to be explanatory of changes in student satisfaction. Each quality dimension is represented in a questionnaire by a number of items intended to represent each quality factor in-depth.

3. Methodology

3.1 Sampling Procedure and Questionnaire Design

The population under study was undergraduate students from all faculties enrolled in the period from January to June of 2008 in a Colombian private university. The total student population in the period under consideration was 5,466.

The sampling procedure applied was the probabilistic stratified random sampling with proportional allocation for the academic programs. The calculated sample size of 1802 was associated with a confidence level of 95% and a 2% error. This sample is one of the largest found in the literature for a single university, recognized in Mostafa (2007) as the desirability of large sample sizes. Data collection took place during the months of March and April 2008.

For the questionnaire design, four aspects were considered: The framework suggested by the 5Qs model (Zineldin, 2007); the specific needs of the stakeholders related to students' feedback; the questions used in similar surveys undertaken within the university under study; a preliminary survey in which we randomly selected groups of students and asked them about the factors impacting on their level of satisfaction.

The last two aspects agree with Harvey's findings (2001), who stated that the experience of many surveys in the United Kingdom and abroad shows that questionnaires derived via consultations with students must contain a core set of questions. The areas of concern about which students are asked to rate their satisfaction and importance, must be derived from prior consultations with students. Harvey (2001) suggested that students determined the questions in the questionnaire on the basis of feedback from focus-group sessions and from comments provided on the previous satisfaction surveys.

The questionnaire comprises a total of 64 items with a Likert response format of five alternatives. A pre-selected group of 36 items is of direct interest to this paper and the other questions represent very specific stakeholders' interests.

Considering each quality dimension, the 36 questions can be divided as follows: Q1 Course contents and Academic Programs (6 items); Q2 Teaching-learning process and teachers' work (9 items); Q3 Infrastructure (8 items); Q4 Information Systems and Communications (6 items); Q5 University experience and university life (3 items); positioning and image of the University (4 items).

In addition to the above questions, we asked students to write the semester they were in and their perception about their overall satisfaction with the learning experience (response variable). Both additional questions were useful in a logistic regression procedure, which will be explained later on.

3.2 Factor Analysis

Factor analysis was performed to reduce the number of variables so that we could research whether a number of variables of interest Y_1, Y_2, \dots, Y_m , were linearly related to a smaller number of unobservable factors F_1, F_2, \dots, F_n . With this objective in mind, the pattern of correlations (or covariances) among the observed measures (variables) could be examined. Measures that were highly correlated (either positively or negatively) were likely to be influenced by the same factor, while those that were relatively uncorrelated were likely to be influenced by different uncorrelated factors. At the end of the process, we compared the selected factors with the grouping of quality dimensions proposed by the 5Qs model.

The factor analysis begins with the calculation of the correlation matrix, obtained from all the independent variables defined. The correlation matrix is analyzed taking into account several indicators to verify whether its characteristics meet the requirements of factor analysis procedure. Among the most important requirements to be met by the data is that the independent variables have to be highly correlated and this has to take into account the determinant of the correlation matrix. In the case of this study a determinant equal to 2.53 E-009 was obtained, which might be considered equivalent to zero, making it feasible to continue with the procedure. Furthermore, we used the Bartlett's Test to evaluate the null hypothesis that variables were uncorrelated in the population. The null hypothesis with high values of the test and with significance less than 0.05 was expected to be rejected. For the data analyzed we obtained: $\chi^2 = 27774.5$, $df = 630$, $Sig = 0.0$, indicating rejection of the null hypothesis of uncorrelated variables. Additionally, we calculated the Kaiser-Meyer-Olkin (KMO) statistic, used to compare the magnitudes of the simple correlation coefficients with respect to the magnitudes of partial correlation coefficients. KMO values between 0.5 and 1 indicate that it is appropriate to apply factor analysis for the sample chosen. In the case of the data matrix of the present study, we obtained a KMO of 0.944. We concluded in this first phase of the factor analysis that, with the support of different types of statistical evidence, the validity and relevance of the data were verified.

For the second phase, we extracted the factors by principal-components analysis. In this step, the first component or factor (F1) identified represented the combination of variables that explained most of the accumulated data variance. After extracting the first factor (or its component variables), the second factor (F2) is defined as the second best combination of variables that best explains the accumulated variance remaining, and so on.

First of all, we proceeded to determine the number of factors or components, for which we took into account the Kaiser criterion (select components with eigenvalues greater than 1) and the percentage of accumulated variance explained by the components. With the support of statistical analysis software (SPSS®), we found that the total variance explained is related to the number of factors selected. According to the Kaiser criterion, it was therefore decided to use six (6) factors which explained 60.793% of the total variance of data (Table 1).

Table 1
Total Variance Explained

Component	Eigenvalues	% of Variance Explained	% of Accumulated Variance
1	13.025	36.181	36.181
2	2.434	6.761	42.942
3	2.047	5.685	48.627
4	1.767	4.908	53.536
5	1.355	3.765	57.301
6	1.257	3.492	60.793

Then we calculated the rotated matrix of factor loadings that contained the correlation between each variable and the factor or component. We chose the varimax-orthogonal rotation approach to simplify the original unrotated factor loadings matrix found. High loadings indicated that a variable is strongly correlated with a particular component. Only those factor loadings with absolute values of 0.4 and above were included, which essentially defined the content of the factor. In Table 2, the grouping of variables which defined each of the six factors (each variable is represented by a code) can be seen.

Table 2
Results from the Rotated Matrix of Factor Loadings

	Factor 1 Loadings	Factor 2 Loadings	Factor 3 Loadings	Factor 4 Loadings	Factor 5 Loadings	Factor 6 Loadings
MD1	.614	A1 .707	R1 .611	P1 .590	C1 .802	C11 .797
MD3	.649	A2 .719	R3 .708	P2 .645	C2 .862	C12 .796
MD4	.666	A3 .719	R4 .632	P3 .614	C3 .733	C13 .649
MD5	.637	A4 .742	R5 .686	P4 .707		
MD6	.614	A5 .693	R6 .664	P5 .660		
MD8	.717	A6 .746	R8 .570	P6 .555		
MD9	.637	A7 .736	R12 .699			
MD10	.660		R13 .732			
MD12	.557					

In accordance with the variables grouped in each factor, such factors could be named as follows: Factor 1 (9 variables): Teaching methodology in the teaching-learning process. Factor 2 (8 variables): Physical resources available to the student at the University. Factor 3 (7 variables): Context, environment and campus life. Factor 4 (6 variables): Perceptions on academic programs. Factor 5 (3 variables): Mechanisms of communication and support to student needs. Factor 6 (3 variables): Release of information about current activities at the university.

This grouping is closely equivalent with the components proposed by Zineldin (2007). The only difference is in the “communication” factor which in our study is divided into two factors: mechanisms of communication and support of student needs (Factor 5), and release of information about current activities at the university (Factor 6).

3.3 Logistic Regression

After making the factor analysis, we performed a logistic regression to determine the impact of different variables in explaining the variability of the dependent variable, defined as students' satisfaction with the learning experience. In this sense, we focused the analysis on measuring such variables' impact by using the Wald Test.

Specifically, we chose the response variable as satisfaction or dissatisfaction with the learning experience. Originally, this variable was measured in the questionnaire on a 5 point Likert scale, from very dissatisfied to very satisfied; due to our research interest, we developed a recoding process where we assigned 1 to satisfied (grouping answers from categories 4 and 5), and 0 for dissatisfied (grouping answers from categories 1, 2 and 3). The logistic regression procedure was performed for 37 independent variables, 36 of them qualitative, studied in Factor Analysis, and the semester, which was a new variable (quantitative)

There are different systematic strategies for the selection of variables to be included in the best regression model. One of them is to start with a model with all variables and interactions and, after that, to eliminate such variables which do not improve the quality of the model according to the specified criterion. This kind of model fitting is known as “backward regression” and it was used in our research. Of the total of 1802 records in the database, the logistic regression analysis was done with 1417, due to some missing data in the response variable.

Considering a significance threshold of 0.5, variables with values of significance below (or close to) 0.5 were selected, which allowed us to reject the null hypothesis stating that the corresponding coefficients of such variables in the regression model were not significant. The selected variables were, therefore, highly influential variables in the behavior of the response variable (student satisfaction/dissatisfaction). Table 3 shows the results obtained for the selected variables.

From the above analysis, the variables that best contribute to the explanation of student satisfaction (dissatisfaction) are the following:

M12: “Assessment techniques (exams, projects, etc.) challenged me to be better”.

R1. “The University's physical facilities are comfortable and adequate for the development of my academic activities”.

A2. “I feel that I can experience intellectual growth at the University”.

A3. “My experience at the University has fulfilled my expectations”.

A6. “I am confident that the trajectory of the University and academic program give me high-level performance in a job”.

A7. “There is a commitment to academic excellence at the University”.

Although the semester variable (which is called SEM) has a significance of 0.075, it was decided to include it because of the possibility to better contributing to the explanation of students' satisfaction, given its significance value close to the threshold (0.05).

Table 3
Beta Coefficients Estimation – Significant Variables, Iteration 1

Variable	β	SE	Wald test	Significance	Exp(β)	Confidence Intervals 95% - Exp (β)	
						Lower	Upper
Semester	-.057	.032	3.179	.075	.945	.888	1.006
MD12	.647	.211	9.355	.002	1.910	1.262	2.890
R1	.427	.221	3.727	.054	1.532	.994	2.363
A2	.581	.259	5.019	.025	1.788	1.075	2.974
A3	.583	.238	5.987	.014	1.792	1.123	2.860
A6	.615	.246	6.238	.013	1.849	1.141	2.995
A7	.512	.244	4.420	.036	1.669	1.035	2.690

In a second iteration, we ran the model only with the significant variables in the initial step. Table 4 shows the results.

In Table 4, according to the significance level, all variables were significant except the variable called R1 ("The University's physical facilities are comfortable and adequate for the development of my academic activities"). We ran the model again (iteration 3), without R1, and the new results are shown in Table 5.

For this final model, all variables were significant, making it the best choice among the three models tested. However, we analyzed the goodness-of-fit of the three models obtained because of iterations by applying the Hosmer-Lemeshow (H-L) Statistic.

This test builds a contingency table and divides data into ten groups (deciles) using estimated probabilities. Afterwards, it uses a Chi-square distribution to compare the observed frequencies with expected ones in each group. The results of the Chi-square value for the three models are shown in table 6.

The H-L Statistic compares such values with the reference value which is a Chi-square with $j-2$ degrees of freedom and significance level α , being j the number of groups. In our case, the Chi-square value was $\chi^2_{\alpha, j-2} = 21.95$. By exploring the Chi-square values in table 6, given that $\chi^2 < \chi^2_{\alpha, j-2}$ for each model, then it is possible to conclude that all models are adequate for the significance level defined.

Because the model obtained in the second iteration contained 6 significant variables in the study of the variability of the response variable, and considering that this model presents an appropriate fitting according to the H-L test, this model was chosen as the most suitable for the purpose of the present study.

In this case, the significant variables are consistent with a model that explains the variability of students' satisfaction through the following equation:

$$\ln(p_i/(1-p_i)) = -0.510 + 0.869M12 + 0.693A6 + 0.821A3 + 0.433A2 + 0.643A7 - 0.073SEM \quad (1)$$

The variable called "M12" involved the "methodology" component and the significance of this variable was the highest, with Beta equaling 0.869, and the positive sign indicated that its presence

increased the value of the response variable. In this way, if the student feels that evaluations are challenging, then satisfaction with the learning experience will be higher.

The variables called A2, A3, A6, A7, related to university life, positioning and image of the university, have positive Beta coefficients, which implies that increasing the positive perception of these variables brings about increasing satisfaction. These variables are linked to students' trust when facing their professional career, the intellectual growth that they may experience and the academic excellence offered to them. But it is particularly important that the A3 variable related to students' expectations appears to be a contributing factor in explaining the students' overall satisfaction. This confirms what Hill (1995) had suggested, that there was students' satisfaction when perceptions were met or exceeded expectations.

On the other hand, the variable called semester shows an inverse relationship with satisfaction (Beta equals -0.073). Namely, as the students progress through each year of their professional career, the level of overall satisfaction with the learning experience tends to decrease over time. This was an important finding for the institution under analysis and suggests for future research the necessity of including the impact of this variable when modeling student satisfaction levels.

4. Conclusions

Going deeply into the factors affecting students' satisfaction requires a systemic vision to penetrate the inner structure of the interacting elements responding to the student as a partner in the teaching-learning process. First of all, we tested the quality framework hypothesis proposed by Zineldin (2007) for higher education. By comparing the 5Qs model with our findings, we found that Zineldin's framework was similar to the research findings. Obviously, other tests would be needed, considering other institutions and other contexts as well. The only disagreement was with the "communication" factor, which could be, in fact, two factors having different impacts on student satisfaction.

Table 4
Parameters Estimation, Significant Variables, Iteration 2

Variable	β	SE	Wald test	Significance	Exp(β)	Confidence Intervals 95% - Exp (β)	
						Lower	Upper
MD12	.856	.165	27.030	.000	2.353	1.704	3.249
R1	.238	.164	2.109	.146	1.269	.920	1.750
A2	.405	.204	3.931	.047	1.500	1.005	2.239
A3	.803	.185	18.944	.000	2.233	1.555	3.205
A6	.688	.192	12.791	.000	1.990	1.365	2.902
A7	.643	.198	10.541	.001	1.902	1.290	2.803
Semester	-.074	.026	8.033	.005	.929	.882	.977

Table 5
Parameters Estimation, Significant Variables, Iteration 3

Variable	β	SE	Wald test	Significance	Exp(β)	Confidence Intervals 95% - Exp (β)	
						Lower	Upper
MD12	.869	.163	28.298	.000	2.385	1.731	3.285
A2	.433	.202	4.581	.032	1.542	1.037	2.294
A3	.821	.183	20.055	.000	2.273	1.587	3.256
A6	.693	.191	13.111	.000	1.999	1.374	2.909
A7	.673	.196	11.728	.001	1.959	1.333	2.880
Semester	-.073	.026	7.905	.005	.930	.883	.978

Table 6
The Hosmer-Lemeshow (H-L) Statistic

Models	χ^2	df	Sig.
Model 1 – Iteration 1	7.297	8	.505
Model 2- Iteration 2	3.430	8	.905
Model 3 - Iteration 3	2.809	7	.902

Regarding the variables' impact on satisfaction, the significant variables in explaining students' satisfaction are related mostly to the confidence felt by students about their university and its academic program.

This satisfaction is influenced by the students' perceptions about the institution, and specifically their perception about commitment to academic excellence, the positioning of the professional career and the academic process itself, so that they can perceive an intellectual growth.

However, the most influential variable in explaining students' satisfaction was the perception of the challenge that students may experience in the assessment of their knowledge. This implies that students need to have confidence with the quality of the learning received. On the other hand, it was found that the semester is an important variable which deserves some attention in the modeling of satisfaction. Improvement processes in any institution may consider the changing of the satisfaction levels from the beginning to the end of the career, which allows segmented plans according to the students' intellectual growth.

Finally, it is important to note for applicability purposes that it is necessary to consider in the explanation of the satisfaction variability (explained variance) that there are a number of uncontrollable factors which were beyond the scope of this paper, but that are truly important and depend on the students' family environment (as mentioned by Walter, 2006). It would be an interesting task to complement the present research with the perception of those factors in a satisfaction survey to build effective student wellbeing programs with the support of psychologists.

References

- Berger, J. and Milem, J. (1999). The Role of Student Involvement and Perceptions of Integration in a Causal Model of Student Persistence. *Research in Higher Education*, 40, 641-664.
- Brenders, D., Hope P. and Ninnan, A. (1999). A Systemic Student-Centered Study of University Service. *Research in Higher Education*, 40, 665-685.
- Brown, R. and Mazzarol, T. (2009). The Importance of Institutional Image to Student Satisfaction and Loyalty within Higher Education. *Higher Education*, 58, 81-95.
- Cook, M. (1997). A Student's Perspective of Service Quality in Education. *Total Quality Management*, 8, 120-125.
- Cronin, J. and Taylor, S. (1992). Measuring Service Quality: A Reexamination and Extension. *Journal of Marketing*, 56, 55-68.
- Darlaston-Jones, D., Pike, L., Cohen, L., Young, A., Haunold, S. and Drew, N. (2003). Are They Being Served? Students' Expectations of Higher Education. *Issues in Educational Research*, 13, 31-52.
- Demaris, M. and Kritsonis, W. (2008). The Classroom: Exploring its Effects on Persistence and Satisfaction. *Focus on Colleges, Universities and Schools*, 2, 1-9.
- Harvey, L. (2001). Student Feedback: A Report to the Higher Education Funding Council for England. Research report, Centre for Research into Quality, The University of Central England, Birmingham, United Kingdom.
- Hayes, T. (2007). Delphi Study of the Future of Marketing of Higher Education. *Journal of Business Research*, 60, 927-931.
- Hennig-Thurau, T., Langer, M. and Hansen, U. (2001). Modeling and Managing Student Loyalty: An Approach Based on the Concept of Relationship Quality. *Journal of Service Research*, 3, 331-344.
- Hill, F. (1995). Managing Service Quality in Higher Education: The Role of the Student as Primary Consumer. *Quality Assurance in Education*, 3, 10-21.
- Jurkowsch, S., Vignali, C. and Kaufmann, H. (2006). A Student Satisfaction Model for Austrian Higher Education Providers Considering Aspects of Marketing Communications. *Innovative Marketing*, 3 (Special Edition), 9-23.
- Lee, J. and Tai, S. (2008). Critical Factors Affecting Customer Satisfaction and Higher Education in Kazakhstan. *International Journal of Management in Education*, 2, 46-59.
- Lounsbury, J.W., Saudargas, R.A., Gibson, L.W. y Leong, F.T. (2005). An investigation of broad and narrow personality traits in relation to general and domain-specific life satisfaction of college students. *Research in Higher Education*, 46(6).
- Mishra, S. (2007). Quality Assurance in Higher Education: an Introduction (first edition). Bangalore: National Assessment and Accreditation Council (NAAC).
- Mostafa, M. M. (2007). A Comparison of SERVQUAL and I-P Analysis: Measuring and Improving Service Quality in Egyptian Private Universities. *Journal of Marketing for Higher Education*, 16, 83 -104.
- Oliveira, O. and Ferreira, E. (2009). Adaptation and application of the SERVQUAL scale in higher education. Paper presented at the 20th Annual Conference of the Production and Operations Management Society (POM), Orlando, Florida. Available at: <http://coba.georgiasouthern.edu/hanna/FullPapers/011-0072.pdf>
- Owlia, M. and Aspinwall, E. (1996). A Framework for the Dimensions of Quality in Higher Education. *Quality Assurance in Education*, 4, 12-20.
- Pichardo, M., García, A., De la Fuente, J. and Justicia, F. (2007). El Estudio de las Expectativas en la Universidad: Análisis de Trabajos Empíricos y Futuras Líneas de Investigación. *Revista Electrónica de Investigación Educativa*, 9, 1-16.
- Parasuraman A., Zeithaml, V. and Berry, L. (1985). A Conceptual Model of Service Quality and its Implications for Future Research. *Journal of Marketing*, 49, 41-50.
- Parasuraman A., Zeithaml, V. and Berry, L. (1988). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Services Quality. *Journal of Retailing*, 64, 12-40.
- Parasuraman A., Zeithaml, V. and Berry, L. (1994). Reassessment of Expectations as a Comparison Standard in Measuring Service Quality: Implications for Further Research. *Journal of Marketing*, 58, 111-124.
- Postema, M. and Markham, S. (2002). Student Satisfaction: A Method for Exploring Quality Factors within Computer Education. *New Zealand Journal of Applied Computing and Information Technology*, 6, 51-59.
- Tan, K. and Kek, S. (2004). Service Quality in Higher Education Using an Enhanced SERVQUAL Approach. *Quality in Higher Education*, 10, 17-24.
- Walter, S. (2006). Antecedentes da Satisfação e da Lealdade de Alunos de uma Instituição de Ensino Superior. Master dissertation, Business Administration Department. Universidade Regional de Blumenau, Brasil.
- Wright, R. (1996). Quality Factors in Higher Education: The Students' Viewpoint. *College Student Journal*, 30, 269-273.
- Yeo, R. (2009). Service Quality Ideals in a Competitive Tertiary Environment. *International Journal of Educational Research*, 48, 62-76.
- Zeithaml, V., Berry, L. and Parasuraman, A. (1996). The Behavioral Consequences of Service Quality. *Journal of Marketing*, 60, 31-46.
- Zineldin, M. (2006). The royalty of loyalty: CRM, Quality and Retention. *Journal of Consumer Marketing*, 23, 430-437.
- Zineldin, M. (2007). The Quality of Higher Education and Student Satisfaction Self assessment and Review process A TRM Philosophy and 5Qs Model. Paper presented at Second International Conference Education, Economics, and Law: Traditions and Innovations. Växjö University, Sweden. Available at: http://tempus.ulim.md/proj_dis.php