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Adaptation and application of the SERVQUAL scale in higher education

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ABSTRACT

Higher education in developing countries has serious quality problems. In order to change this scenario, it is necessary to invest in quality systems and tools for improvement. The SERVQUAL scale is one of these alternatives. It is used to measure the gap between quality expectations and perceptions in services making it possible to establish action plans. The objective of this paper is to propose an adaptation of the SERVQUAL scale's generic questionnaire for the higher education service sector and present the main results of its application in students of the production engineering program at São Paulo State University (UNESP) in Brazil. Thirty-eight questionnaires were applied to measure perception in entering students and twenty-eight to measure expectations in graduating students.

Key words: SERVQUAL; Quality management; Service management, Higher education.

1. INTRODUCTION

In the current socioeconomic context, the service sector has become increasingly more important, revealing the need to know and study the particularities of its operations and to institute specific management methodologies that fit its context and specificity. But it is necessary to understand that service processes are different from manufacturing processes, especially due to their intangible nature and the direct participation of clients.

Aiming to make clients loyal, companies have made every effort to meet their needs and exceed their expectations. The SERVQUAL scale is one of the tools that can help in this sense.

According to Oliver (*apud* SALOMI and MIGUEL, 2005), SERVQUAL is the method that assesses client satisfaction as a result of the difference between expectation and the performance obtained. According to Zeithaml, Parasuraman and Berry (1990), SERVQUAL is universal and can be applied to any service organization to assess the quality of services provided.

Higher education institutions are also in search of improvements in teaching service quality to satisfy the expectations of their students and the market. However, since education services have very particular characteristics, the SERVQUAL model must be adapted according to the most important determining factors: reliability, tangibility, responsibility, security and empathy, as proposed by Parasuraman, Zeithaml and Berry (1985).

Thus, the survey question that guided the elaboration of this study was: how is it possible to adapt quality tools, more specifically the SERVQUAL scale, to measure quality in Higher education service activities?

The main objective of this paper is to adapt the SERVQUAL scale to the Higher

education service activity and to present the results of its application in an institution for teaching engineering.

2. LITERATURE REVIEW

A brief theoretical review will be presented below about Service Management, Quality Management and SERVQUAL.

2.1. Service Management

According to Lovelock (2001), services are economic activities that create value and provide benefits to the client at specific times and in specific places as a result of a desired change in, or on behalf of, the one that receives the service.

According to Meirelles (2006), a service is essentially intangible and only assessed when combined with other functions, that is, with other tangible productive processes and products. This intangible nature is associated with this process, which *à priori* cannot be touched. In other words, the providing of a service tends to occur simultaneously with consumption. Production occurs starting the moment the service is ordered and it finishes as soon as the demand is met.

Services have some specific characteristics that differentiate them from the manufactured good. Gianesi and Corrêa (2004) say the following special characteristics of service operations are the main ones: intangibility, client participation and simultaneous production and consumption.

According to Coelho (2004, p. 36), "in service management it is important to understand how clients assess the quality of the service provided, that is, how quality is perceived by the client".

2.1.1. Higher Education Service

The quality of Higher education is fundamental to a country's development because universities are the ones that prepare the professionals who will work as managers in companies and manage public and private resources and care for the health and education of new generations.

"Higher education has been increasingly recognized as a service industry and, as a sector, it must strive to identify the expectations and needs of its clients, who are the students" (MELLO, DUTRA and OLIVEIRA, 2001, p. 130).

According to Lovelock (2001), education service is classified as a service with intangible actions, directed towards the minds of people, with continuous delivery, conducted through a partnership between the service organization and its client, and although it provides high personal contact, there is low customization.

The institutions must work to obtain a standard of quality that exceeds client and/or student expectations and needs, extrapolating the assessments from legal demands (PEREIRA, 2004).

In this study, students in the Production Engineering program at the São Paulo State University (UNESP), Bauru Campus, were given the SERVQUAL questionnaire adjusted to Higher education services.

According to the American Industrial Engineering Association (*apud* FLEURY, 2008),

> the Production Engineering concerns the design, improvement and installation of integrated systems of people, materials, information, equipment and energy for the production of goods and services. It is based on specific knowledge and abilities associated with physical and social sciences and mathematics, as well as the principles and methods of project engineering analysis in order to specify, predict and assess the results obtained for these systems.

2.2. Quality Management

Quality management is a broad theme that encompasses every sort of organization, multinational or national, eastern or western, large or small, services or manufacturing and public or private (DELAZARO, 1998). According to Oliveira (2004), its concept depends on the context in which it is applied, in face of the subjectivity and complexity of its meaning. Bateson (2001, p.363) says “quality is generally considered an attribute in consumer choices”.

Quality in services can be defined as a customer satisfaction index for any service, and this satisfaction can be measured by any criteria (SATOLLO *et al*., 2005).

Quality in services provides a competitive factor for continued consumption, especially when intangibility relations are tightened between quality and the services. Responsibility and trust, two of the dimensions of service quality grouped by Parasuraman, Zeithaml and Berry (1985), generated by prior experience, are important factors for determining perceived quality by clients (ZANELLA, LIMA and LOPES, 2006).

Quality is judged according to perceived satisfaction. According to Grönroos (2005, p.54), perceived quality is determined "by the gap between expected quality and experienced quality", that is, it is the difference between client perceptions and expectations.

> Satisfying the clients’ immediate and explicit expectations should be sought in the short term. However, in the mid and long term, it is important to develop competences to achieve their real needs, even those that are not explicit or are unconscious (COELHO, 2004, p.37).

According to the same author, quality is only measured at the end of the process, that is, when the service has been concluded, and there is no way to change client perception regarding the service received.

2.3. SERVQUAL

According to Parasuraman, Zeithaml and Berry (1985), regardless of the type of service, consumers basically use the same criteria to assess quality. Service quality is a general opinion the client forms regarding its delivery, which is constituted by a series of successful or unsuccessful experiences. Managing gaps in service will help the company improve its quality. But gaps are not the only means clients use to judge a service. They can also use five broad-based dimensions as judgment criteria: reliability, tangibility, responsibility, security and empathy (LOVELOCK, 2001).

These dimensions are briefly commented below (BATESON and HOFFMAN, 2001; LOVELOCK, 2001):

- *Reliability:* is the company reliable in providing the service? Does it provide as promised? Reliability reflects a company's consistency and certainty in terms of performance. Reliability is the most important dimension for the consumer of services;

- *Tangibility:* how are the service provider's physical installations, equipment, people and communication material? Since there is no physical element to be assessed in services, clients often trust the tangible evidence that surrounds it when making their assessment;

- *Responsibility:* are company employees helpful and capable of providing fast service? It is responsible for measuring company and employee receptiveness towards clients;

- *Security:* are employees well-informed, educated, competent and trustworthy? This dimension encompasses the company's competence, courtesy and precision; and

- *Empathy:* this is the capacity a person has to experience another's feelings. Does

the service company provide careful and personalized attention?

These elements clearly have a highly subjective factor linked to the person who perceives the service. In reality, according to Kilbourne *et al.* (2004), every type of service can have determining factors that are considered more important than others, which will depend on environment characteristics or type of activity.

It is difficult to measure the quality of service operations because they have the characteristic intangibility. Aimed at solving this problem, Parasuraman, Zeithaml and Berry (1985) developed a methodology in which there is a comparison between several orders of expectations and perceptions of service quality by the consumer. These differences between perceptions and expectations are addressed in the quality in service model shown in Figure 1.

This model seeks to help managers understand the sources of problems in quality and how they can improve them (COELHO, 2004).

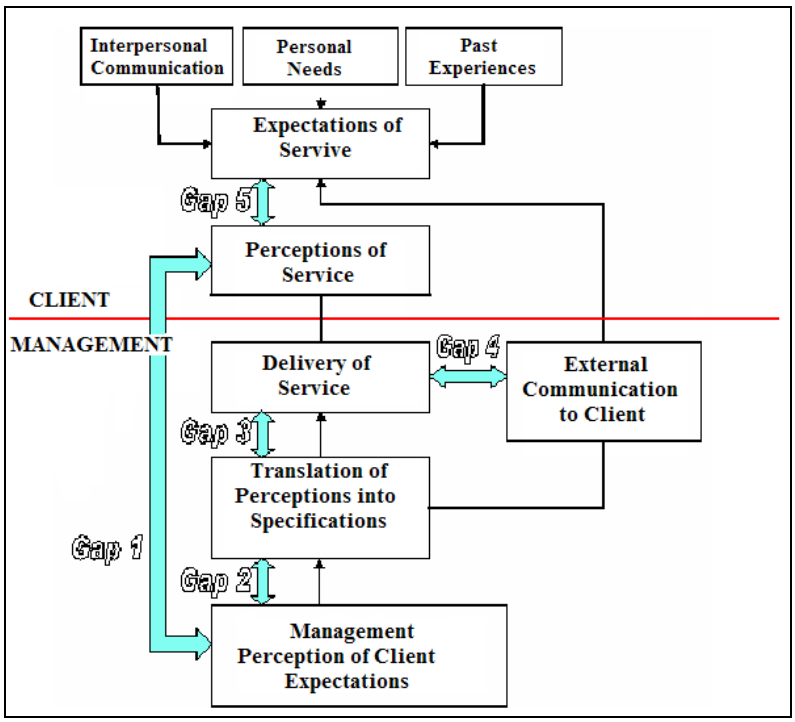

Figure 1: Quality in services model
Source: Parasuraman, Zeithaml and Berry (*apud* SALOMI, 2005).

SERVQUAL is an instrument to measure quality that stems from this model and

works with the difference in scores (gaps) in the form of a questionnaire. The model's five gaps are shown in Chart 1.

***GAP* 1**
What is it?
GAP 1 is the discrepancy that can exist between the perception of executives and the real expectations of consumers.
What causes it?
Management's failure to correctly identify client expectations.
How to correct it?
Open formal and informal channels of communication from the clients to the top, passing through the people in contact with the public; better market surveys on service quality and apply them with greater frequency, and; reduce hierarchy levels.
GAP 2
What is it?
GAP 2 is the discrepancy between management's perception of client expectations and the specifications of service quality, that is, it is the supply of low quality even though the company has appropriate procedures.
What causes it?
Limited resources, lack of operational tools to bring the client's voice to service specifications; management's indifference and rapid change in market conditions.
How to correct it?
Management's commitment; Make resources available and use tools to bring the voice of the client to specifications (for example, QFD – Quality Function Deployment)
GAP 3
What is it?
GAP 3 is the discrepancy between service quality specifications and the service actually delivered.
What causes it?
Lack of knowledge about specifications, lack of ability to carry out the specified or lack of commitment by collaborators.
How to correct it?
Make specifications known, ensure the necessary profile of the collaborator at recruiting or complete it with training; and assess collaborator performance through greater and better supervision or improvements in team work and in the organizational climate.
GAP 4
What is it?
GAP 4 is the discrepancy between the service's specified quality and what the company communicates externally.
What causes it?
Lack of communication and the client does not know what to expect or more is promoted than actually delivered.
How to correct it?
Improve the communication between the diverse sectors of the company and between it and the target public for the communications or hold communication to what is actually delivered.
GAP 5
What is it?
GAP 5 is the difference between what the client expects and what the company actually delivers.
What causes it?
A gap or a series of gaps from 1 to 4.
How to correct it?
Correcting those gaps with problems.

Chart 1: Five gaps of the SERVQUAL Model
Source: Adapted from Satolo *et al.* (2002).

The SERVQUAL scale (questionnaire) has two sections: one to map client expectations in relation to a service segment and the other to map perception in relation to a certain service company (FITZSIMMONS and FITZSIMMONS, 2000).

The original SERVQUAL scale uses 22 questions to measure the five dimensions of service quality: reliability, tangibility, security, empathy and responsibility. Chart 2 shows the original version of the questionnaire.

Item		Expectation (E)	Performance (P)
1	**Tangibility**	They should have modern equipment.	XYZ has modern equipment.
2		The physical installations should be visually attractive.	XYZ's physical installations are visually attractive.
3		The employees should be well-dressed and clean.	XYZ's employees are well dressed and clean.
4		The appearance of company installations should be conserved according to the service offered.	The appearance of XYZ's physical installations is conserved according to the service offered.
5	**Reliability**	When these companies promise to do something in a certain time, they must do it.	When XYZ promises to do something in a certain time, it really does it.
6		When clients have any problem with these companies, the latter must be solidary and make them feel secure.	When you have a problem with XYZ, it is solidary and makes you feel secure.
7		These companies should be of confidence.	XYZ can be trusted.
8		They should provide the service in the time promised.	XYZ provides the service in the time promised.
9		They should keep their records correctly.	XYZ keeps its records correctly.
10	**Responsibility**	It should not be expected that they inform clients exactly when the services are to be executed.	XYZ does not inform exactly when services will be executed.
11		It is not reasonable to expect immediate availability of company employees.	You do not receive immediate services from XYZ employees.
12		Company employees do not need to be always available to help clients.	XYZ employees are not always available to help clients.
13		It is normal for them to be too busy to readily respond to requests.	XYZ employees are always too busy to respond to client requests.
14	**Security**	Clients should be able to believe in the company's employees.	You can believe XYZ employees.
15		Clients should be able to feel safe in negotiating with company employees.	You feel secure negotiating with XYZ employees.
16		The employees should be polite.	XYZ employees are polite.
17		The employees should obtain adequate support from the company to perform their tasks correctly.	XYZ employees do not obtain adequate support from the company to perform their tasks correctly.
18	**Empathy**	It should not be expected for the companies to pay individual attention to the clients.	XYZ does not pay individual attention to you.
19		It should not be expected for the employees to give personalized attention to the clients.	XYZ employees do not give personal attention.
20		It is absurd to expect the employees to know client needs.	XYZ employees do not know their needs.
21		It is absurd to expect these companies to have the clients' best interests as their objective.	XYZ does not have your best interests as its objective.
22		It should not be expected for the business hours to be convenient for all clients.	XYZ does not have convenient business hours for all clients.

Chart 2: Original version of the SERVQUAL scale
Source: Oliveira (2008).

These questions should be scored on a Likert scale from 1 to 7. The extremes are marked as agree completely (excellent) and disagree completely (mediocre), as in Chart 3.

7	6	5	4	3	2	1
Excellent	**Very good**	**Good**	**Satisfactory**	**Little Satisfactory**	**Weak**	**Mediocre**

Chart 3: Five *Gaps* of the SERVQUAL Model
Source: Adapted from Dettmer, Socorro and Katon (2002).

The results of the two sections (perceptions and expectations) are compared to reach a parameter (gap) for each of the questions, that is, the final score is generated by the difference between them (Parameter = Perception – Expectation).

A negative result indicates the perceptions are below expectations, revealing the

service failures that generate an unsatisfactory result for the client. A positive score indicates the service provider is offering a better than expected service (COELHO, 2004).

Badri, Abdulla and Al-Madani (2004) underscore some services in which the SERVQUAL model can be applied, including the Higher education service, the object of study in this paper.

3. MATERIAL AND METHODS

This study began by establishing the objective of the research with a bibliographic study on service management, including Higher education, quality management and the SERVQUAL scale.

The SERVQUAL generic questionnaire was then adapted to the characteristics of Higher education, which according to Chagas (2000) should be done within a logical sequence derived from an improvement process. The adapted model was then submitted to a pilot test to identify possible problems and opportunities for improvement. It was then applied to students in the Production Engineering program at São Paulo State University (UNESP) - Bauru Campus.

The questionnaire was applied to 38 beginning students, in its expectations version, before they could have contact with course structure, and to 28 concluding students in its perception version. After applying the questionnaires, the data were tabulated and interpreted.

The adapted SERVQUAL questionnaire was used in this study to measure gap 5 in the service quality model shown in Figure 1, and the main results were presented through the analysis of data and each dimension.

A quantitative study was conducted, which, according to Nakano and Fleury (1996), is used when the solution to a problem is given by an aspect of reality with rigor

and generates conclusions that permit generalizations and replication of results.

According to Fleury (2006), the quantitative focus uses data collection and analysis to answer survey questions and it trusts numerical measurement, counting and often the use of statistics to establish a population's behavior standards.

4. PROPOSAL FOR ADAPTATION

An adapted version of the SERVQUAL scale for Higher education services was proposed through a review of literature. Chart 4 shows the adapted questionnaire model that was used to conduct the quality expectations and perceptions survey for the Production Engineering program at UNESP/Bauru by its students.

	Expectation (E)	Performance (P)
Tangibility	1 – Excellent Higher education institutions must have modern equipment, such as laboratories. 2 – Higher education institution installations must be well conserved. 3 – Employees and teachers at excellent institutions of Higher education must present themselves (clothes, cleanliness, etc.) in an appropriate manner for their position. 4 - The material associated with the service provided in excellent institutions of Higher education, such as journals, printed matter, must have a good visual appearance and be up to date.	1 – Your Higher education institution has modern equipment, such as laboratories. 2 – Your Higher education g institution installations are well conserved. 3 – The employees and teachers at your institution of Higher education present themselves (clothes, cleanliness, etc.) in an appropriate manner for their position. 4 - The material associated with the service provided in your institution of Higher education, such as journals, printed matter, has a good visual appearance and is up to date.
Reliability	5 – When excellent institutions of Higher education promise to do something in a certain time, they must do so. 6 – When a student has a problem, excellent institutions of Higher education demonstrate sincere interest in solving it. 7 – Excellent of institutions of Higher education will do the job right the first time and will persist in doing it without error.	5 – When your institution of Higher education promises to do something in a certain time, it does so. 6 – When you have a problem, your institution of Higher education demonstrates sincere interest in solving it. 7 – Your institution of Higher education will do the job right the first time and will persist in doing it without error.
Responsibility	8 – Employees and teachers at excellent institutions of Higher education promise their clients the services within deadlines they are able to meet. 9 – The employees and teachers at excellent institutions of Higher education are willing and available during service providing. 10 – The employees and teachers at excellent institutions of Higher education will always show good will in helping their students. 11 – The employees at excellent institutions of Higher education are always willing to explain doubts their students may have.	8 – Employees and professors at your institution of Higher education promise you the services within deadlines they are able to meet. 9 – The employees and teachers at your institution of Higher education are willing and available during service providing. 10 – The employees and teachers at your institution of Higher education always show good will in helping. 11 – The employees and teachers at your institution of Higher education are always willing to explain your doubts.
Security	12 - The behavior of employees and teachers at excellent institutions of Higher education must inspire confidence in the students. 13 – Students at excellent institutions of Higher education feel safe in their transactions with the institution. 14 - The employees and teachers at excellent institutions of Higher education must be polite to the students. 15 – The employees and teacher at excellent institutions of Higher education must have the knowledge needed to answer student questions.	12 - The behavior of employees and teachers at your institution of Higher education inspire confidence. 13 – You feel safe in your transactions with your institution of Higher education. 14 – The employees and teachers at your institution of Higher education are polite. 15 – The employees and teachers at your institution of Higher education have the knowledge needed to answer your questions.

Empathy	16 – Excellent institutions of Higher education must have convenient business hours for all students 17 – Excellent institutions of Higher education must have employees and teachers who provide individual attention to each student. 18 – Excellent institutions of Higher education must be focused on the best service for their students. 19 – Excellent institutions of Higher education must understand the specific needs of their students.	16 – Your institution of Higher education has convenient business hours for all students. 17 – Your institution of Higher education has employees and teachers who provide individual attention to each student. 18 – Your institution of Higher education is focused on the best service for its students. 19 – Your institution of Higher education understands the specific needs of its students.

Chart 4: SERVQUAL questionnaire adapted to Higher education services

5. PRESENTATION AND DISCUSSION OF RESULTS

Table 1 shows the tabulated results of the SERVQUAL questionnaire applied to the students in the Production Engineering course at UNESP/Bauru.

Table 1: Tabulation of data

		Expectations								**Perceptions**								
		Frequency of Responses								Frequency of Responses								
		1	*2*	*3*	*4*	*5*	*6*	*7*	Average	*1*	*2*	*3*	*4*	*5*	*6*	*7*	Average	**(P-E)**
Tangibility	1	0	0	1	2	11	9	5	5.536	6	5	10	8	5	1	0	3.114	**-2.421**
	2	0	0	1	2	7	11	7	5.750	3	6	10	8	3	4	1	3.514	**-2.236**
	3	5	7	7	3	4	0	2	3.071	0	1	4	4	8	14	4	5.200	**2.129**
	4	1	2	2	3	9	6	5	4.964	0	2	2	9	11	9	2	4.829	**-0.136**
	Average tangibility = -0.666																	
Reliability	5	0	0	0	0	10	7	11	6.036	0	2	7	5	8	11	1	4.647	**-1.389**
	6	0	1	1	5	8	7	6	5.321	1	2	5	10	8	7	2	4.457	**-0.864**
	7	2	1	3	5	6	8	3	4.714	1	1	6	10	11	5	1	4.371	**-0.343**
	Average reliability = -0.865																	
Promptness	8	0	0	3	0	5	11	9	5.821	0	1	2	13	7	11	1	4.800	**-1.021**
	9	0	2	1	3	1	14	7	5.607	0	1	4	6	11	12	1	4.914	**-0.693**
	10	0	0	1	5	5	8	9	5.679	1	2	8	5	10	8	1	4.400	**-1.279**
	11	0	0	1	2	6	7	12	5.964	1	0	4	7	7	9	7	5.114	**-0.850**
	Average promptness = -0.961																	
Security	12	0	0	1	2	4	16	5	5.786	2	0	3	10	11	6	3	4.657	**-1.129**
	13	0	0	2	2	5	10	9	5.786	0	1	1	9	9	11	4	5.143	**-0.643**
	14	1	1	2	7	10	4	3	4.714	0	1	5	6	15	3	4	4.765	**0.050**
	15	0	0	1	0	1	6	20	6.571	0	1	2	9	9	10	4	5.057	**-1.514**
	Average security = -0.809																	
Empathy	16	1	1	2	3	9	8	4	5.071	7	2	6	4	9	4	3	3.857	**-1.214**
	17	4	4	2	5	10	2	1	3.821	2	0	9	8	8	5	3	4.343	**0.521**
	18	0	1	1	2	2	8	14	6.036	1	1	7	10	11	3	2	4.314	**-1.721**
	19	0	0	2	4	10	6	6	5.357	1	4	8	11	7	2	2	3.943	**-1.414**
	Average empathy = -0.957																	
Overall average = -0.852																		

The results of the two sections are compared to arrive at a parameter for each of the questions and also for each of the five dimensions, that is, the final score is generated by the difference between the interviewee's perceptions and expectations. We

underscore that a negative result must be viewed as an opportunity for improvement and not as a simple problem.

Questions 1 to 4 refer to the tangibility dimension, which obtained an overall average of -0.666. The expectation of beginning students in relation to this dimension is high in questions 1 and 2, whereas the corresponding perceptions are the lowest among the entire table of perceptions. Question 3 is the only one in this dimension that has a positive difference between perceptions and expectations (P-E); however this question refers to the presentation (appearance) of employees. This is different from questions 1, 2 and 4, which refer to the physical installation and the institution's equipment. Its results indicate that the institution should invest in improving physical installations and/or equipment.

The reliability dimension is analyzed in questions 5 to 7, which obtained an overall average of -0.865. Questions 5 of the expectations questionnaire only received scores of 5, 6 and 7 in its evaluation, revealing that the students recognize this issue as essential for the quality of the service provided. Therefore, the institution must consider the possibility of investing in training and resources so the promised deadlines can be truly met.

The other statements in the reliability dimension also received high averages, especially in questions related to expectations. Thus, special attention must be given to this aspect since reliability is the most important dimension for the service consumer (BATESON and HOFFMAN, 2001; LOVELOCK, 2001).

Questions 8 to 11 of the questionnaire refer to the promptness dimension and its overall average was -0.961, the worst average among the five dimensions proposed by Lovelock (2001). The difference between perceptions and expectations (P-E) for all questions in this dimension was negative, revealing there are considerable faults in the

service, which are jeopardizing the quality of the service being offered. Minimization of these problems is directly related to the awareness and empowerment of the work force.

Questions 12 to 15 in the adapted SERVQUAL scale refer to the security dimension, which obtained an overall average of -0.809. Question 15 (expectations version) obtained the highest average in the entire table, with 20 of the 28 interviewed students scoring it 7, showing that the security dimension is important for the students who are beginning undergraduate studies. This corroborates what was said by Zanella, Lima and Lopes (2006), who consider this dimension one of the most important, along with reliability.

The final four questions, 16 to 19, refer to the empathy dimension, which obtained an overall average of -0.957. This is one of the lowest, along with the promptness dimension. The averages for the expectations version varied considerably from 3.821 to 6.036, whereas for perception the variation was a lot smaller, from 3.857 to 4.343. In this dimension, the greatest concern is in understanding and meeting client needs. In the specific case of the surveyed course, there are serious problems in business hours for some important support services for the students (secretary, undergraduate section, internship section, etc.). These factors certainly influenced this evaluation and should be seriously considered by the managers.

The overall average for the five dimensions was -0.852. This indicates a great opportunity for improvement in the entire service providing cycle. However, for that to happen, great effort must be made in the following items: training of collaborators in relation to technical as well as behavioral issues, revision in how service processes have been carried out, modernization of infrastructure, including the renovation of buildings and installations, and the adjustment of business hours for some sectors to meet student needs.

6. CONCLUSION

The quality of Higher education services, especially in developing countries like Brazil, must be viewed as a strategic issue for social and technological development and economic growth.

The objective of this study was to provide a small contribution towards improving education service by adapting and using an instrument that, if well used, can generate interesting results for the improvement of undergraduate courses.

We underscore that the theoretical reference presented in this paper in a summarized manner played an important role for the researchers, making it possible to adapt the SERVQUAL scale to the reality of educational service processes and applied to an undergraduate course.

The scientific method used, a quantitative research based on a survey instrument, provided the necessary conditions to conduct this study, proving to be appropriate and generating results with a considerable degree of applicability, although without forgetting scientific rigor.

In relation to application of the scale adapted to the production engineering course at UNESP/Bauru, we observed that the promptness dimension had the largest gap, with an overall average o -0.961, followed by the empathy, reliability, security and tangibility dimensions. Thus, none of the dimensions achieved a mathematically positive result, indicating the perceptions are below expectations and there are faults in the service that are generating unsatisfactory results among the students.

This study did not have the objective of generating proposals from the data collected for direct intervention in the reality of the course. However, it is possible to observe interesting results for the potential use of quality tools – broadly promoted

instruments in scientific literature – for the analysis and generation of action plans for improving the course's service processes.

In conclusion, it is worth underscoring that the objective proposed in this study was to adapt the SERVQUAL scale to the Higher education service activity and to present the results of its application in an engineering institution, and it was appropriately met.

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