POST-AWARD RESEARCH ADMINISTRATION SERVQUAL: A CASE STUDY ON SERVICE QUALITY IN A HIGHER EDUCATION INSTITUTION IN THE CARIBBEAN

ABSTRACT

A case study methodology for analysis and evaluation of service quality at a research administration unit. The case selected for the study was the University of Puerto Rico Mayagüez Campus' (UPRM) Research and Development (R&D) Center. The method of analysis required the development and use of a modified SERVQUAL instrument to gather quantitative and qualitative data about investigator expectations and perceptions of service quality for each R&D Center unit. Researchers develop an adapted control instrument based on the SERVQUAL model to be used in research administration operations (pre-award and post-award). In this case, we present the results of the post-award evaluation. The data was utilized to perform a gap analysis and an impact analysis, the results of which are summarized by individual unit. In all units, investigators prioritized *responsiveness* and *reliability* dimensions over all other aspects of service quality. A comparative section was prepared to identify trends and overall R&D Center behavior. The analysis of researcher perceptions reveals various positive aspects and presents areas with high potential for improvement. Although this article presents only one higher education institution, other research administration units should consider applying the adapted SERVQUAL or other service quality instruments into their research administration operations.

KEYWORDS: SERVQUAL, research administration, higher education institution

INTRODUCTION

Institutions of higher education have the great responsibility of providing society with new ideas, innovations, and technological advances that have a positive social impact. Their social responsibility involves investigating and creating solutions to global problems, both academically and through research. Pursuing this aspect of their mission involves particular challenges that have led to the growth of sponsored program offices and research administration professionals, who must act as institutional stewards while providing direct services to university investigators. These challenges are the management of research funds in compliance with applicable regulations, reducing researcher's administrative burden, and protecting the integrity and credibility of the institution in front of external agents. These challenges can only increase when we focus our attention on the Post-Award Division of a Research Administration Center.

Research Administration Centers must navigate a dual role: they must address compliance functions while maintaining an excellent level of service quality to build productive relationships with key stakeholders, leading to the positive development of the research environment. For this reason, it is important to establish baselines and monitor investigators' opinions and expectations about the services they receive. In this research project, a SERVQUAL questionnaire was developed and adapted to the context of Research Administration, and then administered and validated through a case study at the University of Puerto Rico Mayaguez (UPRM) Research & Development Center (R&DC). The outcome was the development of a tool to measure perceived service quality within the context of Research Administration Centers. There is an ever more important role played by Research Administration Centers in modern universities and their interaction with institutional staff and faculty, making them an important subject of study in the field of service quality.

The principal objective of the study was to develop an adapted control instrument based on the SERVQUAL model that can be used to evaluate the perception of service quality in the Post-Award Division of a Research Administration Center. Additional objectives were:

- Identify which dimensions from the SERVQUAL model are considered the most important when assessing perceived service quality in a Research Administration Center.

- Conduct a case study in the Research and Development Center (R&DC) at UPRM in which the clients would receive a survey to evaluate the perceived quality of service received.
- Analyze the responses of the questionnaires from the clients of the UPRM R&DC.
- Identify strengths in the services offered by the UPRM R&DC.
- Identify critical areas that require monitoring or attention at the UPRM R&DC.

LITERATURE REVIEW

The literature review for this project focuses on two main areas: service quality, and measurement of service quality.

Service quality

There is a significant body of work dedicated to defining service quality and how it can be measured. Several authors have highlighted the differences between evaluating the quality of a service and the quality of a good. The main difference between these two concepts is that indicators such as durability and number of defects can objectively measure quality of a good, while quality of a service must be measured abstractly (Garvin, 1983). Sunayna (2013), Lempts et al. (2012), and Parasuraman, Zeithaml and Berry (1985) attribute the difficulty in its measurement to intrinsic factors unique to services: intangibility, heterogeneity and inseparability of production and consumption. Due to the particular characteristics of services, a proper approach for assessing the quality of services is through the measure of customer perceptions of quality (Yarmen and Sumaedi, 2016).

Gronroos (1984) argues that the quality of service is determined by customer perceptions and expectations about the service (Rebolloso-Pacheco et al, 2005). Customers make a conclusion about the quality of a service received by comparing the level of the service provided to them with their own personal expectations, shaped by experience (Sunayna, 2013). The outcome of this comparison was named “Perceived Service Quality” by Gronroos (1982) and (1984), Takauchi and Quelch (1983) and Parasuraman et al (1985) and (1988).

Perceived service quality was also defined as the degree and discrepancy between service expectation and actual service performance. It shows how well performance is meeting customer

service expectations (Phiri and Mcwabe, 2013). Parasuraman et al (1988) make the clarification that perceived quality "is the customer global attitude or judgment related" to the overall excellence or superiority of a service; it differs from satisfaction, which is associated to a specific transaction. However, these two concepts are related, because individual occurrences of satisfaction over time influence perceptions of service quality.

Model to Evaluate Quality of a Service

Service quality literature has seen a significant increase in recent years. Sultan and Ying Wong (2010) pointed out that "most of these studies have concentrated their findings on the dimensionalities of service quality across industries, cultures and firms".

There are various models to evaluate the dimensions of service quality. The development of these models has sparked a controversy that revolves around the number of dimensions that are relevant and applicable to a specific industry. This controversy has awakened a remarkable interest in the delimitation of service quality categories (Rebolloso-Pacheco et al, 2005). Two service quality models stand out in the literature as being the most widely adopted by researchers: the Nordic model, belonging to the European school and popularized by Gronroos (1982, 1984); and the SERVQUAL model, proposed by Parasuraman, Zeithaml and Berry (1985, 1988, and 1991) and belonging to the American school. (Sultan and Ying Wong, 2010)

Grönroos (1984), in his initial measure model, proposed defined service quality as consisting of three dimensions, namely technical quality (outcomes), functional quality (processes) and corporate image. Technical and functional quality combine to shape the corporate image, which is the customer's perception of the service received (Blythe, 2013, Grönroos, 1984). According to Grönroos (1984), there is an interrelation between technical and functional quality, but since "the performance of staff in direct contact with customers can compensate for a lower technical quality" (Blythe, 2013), functional quality is a more important factor in determining customer perceptions of service quality (Grönroos, 1984). In 1990 Grönroos revised his model to identify six dimensions of service quality (Sunayna, 2013). However, the first version of his model continues to be the most used and referenced.

The competing model from the American school, SERVQUAL, is "a conceptual service quality model able to facilitate the monitoring of clients' service quality expectations and performance" (Gorringe and Hochman, 2006). It has seen significant worldwide adoption as a

useful service quality measurement instrument (Dahan et al, 2016). According to Bayraktaroglu and Atrek (2010) "SERVQUAL assumes that the difference between the customers' expectations about a service and his or her perceptions of the service actually received determines the quality". Parasuraman, Zeithaml and Berry (1985) developed the SERVQUAL theory, and the first version of this instrument identified 10 dimensions of service quality and consisted of 97 items. Later Parasuraman et al. reworked these 10 dimensions into five, which are: tangibility, reliability, responsiveness, assurance and empathy (1988). The most current version of SERVQUAL was launched in 1991 when Parasuraman et al. made the final improvements and adjustments to the original instrument, but kept the same five dimensions. The focus of each dimension is the following:

- Tangibles: physical facilities, equipment, and appearance of personnel.
- Reliability: Ability to perform the promised service dependably and accurately.
- Responsiveness: Willingness to help customers and provide prompt service.
- Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence.
- Empathy: Caring, individualized attention the firm provides its customers.

The instrument measures the gap between performance and expectation through a 22 item Likert Scale survey, which are aligned under these five dimensions.

SERVQUAL "has been empirically examined widely" (Sultan and Wong, 2010, p. 261) and "is a best-known service quality measurement model" (Sukwadi, Yang, and Fan, 2012, p.385), but there have also been conceptual and empirical criticisms leveled against it. Bayraktaroglu and Atrek (2010) explain that there can be issues with "understanding customer expectations, use of the gap approach for service quality, and unsuitability of the measurement tool for use in different industries". There might also be problems related to "low reliability, poor convergent validity, and poor predictive validity" (Bayraktaroglu and Atrek, 2010). In response to these perceived shortcomings, Cronin and Taylor (1992) argued that the gap approach is not adequate for evaluating service quality, and proposed another approach that is exclusively based on current performance. This model is called SERVPERF and is a modification of SERVQUAL.

Studies conducted by Bayraktaroglu and Atrek (2010) and Carrillat, Jaramillo, and Mulki (2007) have evaluated the superiority of these two models. Bayraktaroglu and Atrek's (2010) findings "revealed that both instruments had a good fit for the five-factor model, which indicated

a good construct". Carrillat, Jaramillo, and Mulki (2007) also found that both scales can be successfully used to predict service quality. The literature shows that despite the criticisms raised, SERVQUAL retains its usefulness and can be used to provide an accurate measure of customer perceptions (Jiang, Klein, and Crampton, 2000; Ladhari, 2009).

The purpose of this study was to generate a formal standardized qualitative tool; this was based on adaption of the SERVQUAL instrument. This can be used by all research administration offices or centers, allowing them to evaluate their performance from the perspective of their customer, and to compare their performance with others for making improvements and offering competitive services.

METHODOLOGY

Data Collection

This study utilized a case study methodology. A SERVQUAL instrument adapted for use in a Research Administration Center was developed, with the purpose of evaluating the perceived quality of a service. The case study took place in the Research and Development Center (R&D Center) of the University of Puerto Rico Mayaguez Campus (UPRM). The rationale for case selection was the availability of access to the R&D Center and its potential contribution to local knowledge, as this was the first diagnostic evaluation of overall service quality at the R&D Center. However, the overall goal also involves generating data that is useful beyond the boundaries of Puerto Rico and that can help advance knowledge pertaining to service quality evaluation in the field of research administration.

The literature suggests that the SERVQUAL should be adequately adapted for a specific industry or specific study context in order to gather valuable information (Sultan and Wong, 2010). Therefore, in this study the SERVQUAL questionnaire was adapted for each service area offered to researchers from the R&D Center. The adaptation of the questionnaire followed a three-step process. First, management, employees and clients, not included in the later sample, of the research center were interviewed regarding the process followed by researchers. The results were compared with the evaluation of reports on the Center's structure and processes. The Center's structure has two main customer-facing divisions: Pre-Award Division, and Post Award Division. The Pre-Award Division is composed of the Proposal Development Unit (PDU) and the Proposal

Submission Unit (PSU). The nature of Pre-Award Division services at the R&D Center entails that these units may serve different clients, and they are located in different facilities. The R&D Center Post Award division, on the other hand, is comprised of the offices of Budget, Human Resources, Finance and Accounting, and Purchasing. These offices occupy contiguous workspaces within the same building and they share the same clientele. The final step in the questionnaire adaptation was a pilot with 10 previous clients that were not going to be included in the sample.

These questionnaires were provided to participants through an online platform called Qualtrics. Each participant received a survey specifically designed to evaluate the services they have received during the past three years from the R&D Center, calculated from the date the survey was first distributed (February 2016). The population was chosen because they are the direct beneficiaries of the services offered by the R&D Center, and therefore, they provide valuable information and the insight needed to make improvements to those services. It is important to note that an individual investigator may have utilized the services of multiple units over the previous three years, and therefore may be counted as a participant in more than one unit. For the purpose of demographic data, these investigators were only counted once.

For the Post-Award Division, the initial selected population was 212 participants, composed of all principal investigators and all co-investigators that had an active project managed by the R&D Center and logged through Kuali Coeus, an open source research administration case management program, at the time of the survey. The initial number of possible participants was 212, but 18 investigators had to be excluded from the study based on the nature of their position and/or lack of interaction with R&D Center Services. Some R&D Center account-holders were logged in the record system based on their administrative roles (department chairs, deans, etc.) rather than due to research-related purposes. Others were linked to an open but inactive account at the R&D Center, and had not requested any Post Award services during the previous three years. The final number of possible participants was 194.

DEMOGRAPHIC CHARACTERISTICS

Two hundred two (202) questionnaires were collected from 110 participants. Some investigators receive or have received services from more than one unit over the last three years, and consequently completed more than one questionnaire. Out of the total number of participants, 79 possessed a Ph.D. (71.8%), 26 carried out Postdoctoral studies (23.6%), and 4.5% had a

Master's degree. Most of the researchers that receive R&D Center services belong to the College of Engineering (41.8%) and the College of Arts & Sciences (40.9%). A small number of participants are from the College of Agriculture, the College of Business Administration, or Sea Grant.

Thirty-one (31) participants (28.2%) did not have an active grant administered by the R&D Center at the moment they completed the survey. The remaining 79 participants had at least one active grant or contract through the R&D Center. It is important to note that 26 participants (23.6%) had four or more grants or contracts administered by the R&D Center at the time of the survey. The average number of proposals submitted by investigators over the previous two years was 0-3 (54.55%), followed by 4-7 with 39.09% of all participants. In regards to the amount of funds managed for individual investigators by the R&D Center (estimated total over the life of the grant), 45.45% (50 participants) selected "more than $500,000." The next highest portion of participants (27) selected $100,001-$500,000.

The majority of participants (63.64%) have used R&D Center services for over five years. A smaller portion (7.25%) had been using R&D Center services for less than six months at the time of the survey. Therefore, most investigators that participated in the study had knowledge about the workings of the offices at the R&D Center, and about its employees, based on years of experience utilizing their services. Additionally, 30.84% of participants have held positions as Principal Investigator (PI) and Co-Investigator (Co-PI) on externally funded research projects, followed by 26.17% that have only been PIs. Fourteen-point ninety-seven percent (14.97%) have been Key Personnel on a project in addition to their experience as PI and Co-PI. Another noteworthy demographic characteristic is that 35 investigators have had experience receiving research administration services at other institutions, and 74% of these researchers obtained this experience at a research-intensive university.

GAP ANALYSIS

To gauge investigators' perception of the quality of service received, a gap analysis was performed. A gap analysis is a method of assessing the differences in performance and expectation level of clients from a service. The individual item gap score quantifies the difference between investigators' expectations and their perception. The gap score for each quality dimension is calculated by subtracting the perception mean value from the expectation mean value. This

calculation was performed for each researcher-facing service unit of R&D Center (Post-Award Division). Table 1 provides an overview of the perception, expectation, and gap score for all quality dimensions in each unit. A positive value in the gap column indicates the existence of a service quality deficiency; a dimension where investigators' expectations are not met by actual service performance. Conversely, a negative value in the gap column indicates a dimension where service exceeds expectations.

Table 2 provides a detailed breakdown of expectation, perception, and gap scores for each of the five dimensions' individual items, averaging investigators' opinions regarding each item. Additionally, the result of a hypothesis test (p-value) is provided. The significance of the gap score for each item is indicated by its p-value, provided for each item. The null hypothesis was that perception score is equal to expectation score; that is, the gap score is equal to zero. The alternative hypothesis was that there is a difference between the two scores. The hypothesis test verifies whether there is a significant difference between the quality of service the investigator is expecting to receive and that of the actual service they are receiving. On a scale from 0 to 1, the closer the p-value is to 0, the greater statistical significance in the gap, which warrants further analysis. In this study, our significance level α was set at 0.05. This analysis must consider the gap score, relative priority ascribed by investigators to the corresponding dimension, and relevant investigators' comments to contextualize the p-value score. The hypothesis test performed was a paired t-test for each item of the questionnaire in each dimension studied.

For this study, we propose that a negative gap score in an item indicate a strength in the corresponding unit. A gap score between 0 and 0.1 in an item would indicate a mild deficiency. If a positive gap score is large in an item, it must be considered a critical item that requires targeted improvement.

Post-Award Division Gap Analysis by Quality Dimension

Eighty-eight (88) investigators answered the questionnaire about the Post-Award Division's services, for a 45% response rate. Table 1 provides the expectation, perception and gap scores for each quality dimension. The data collected shows numerous critical areas and significant opportunity for improvement across all dimensions. Investigators' comments emphasize awareness of the limited resources available to the R&D Center for carrying out Post-Award functions, but the consensus observed in the SERVQUAL data is that there is a large service

quality gap between the expected service and the perceived performance of this unit. All dimensions show large positive gaps, with the average Post-Award gap score being 1.767 (see Figure 1). The largest gap of the four dimensions is *responsiveness* (employees' willingness to help researchers and provide prompt service) with 2.190, followed by *reliability* (ability to perform the promised service dependably and accurately) with 2.157. The values reflected in these Post-Award dimensions compose the most significant service quality gaps identified in this study. *Tangibles* was the only dimension to receive a gap score lower than 1. There were no significant unit strengths identified by investigators.

Table 1: Quality Dimension Scores for the Post-Award Division (n=88)

Dimensions	**Exp**	**Per**	**Gap**
Responsiveness	6.597	4.406	2.190
Reliability	6.525	4.368	2.157
Assurance	6.594	4.724	1.870
Empathy	6.414	4.702	1.711
Tangibles	5.858	4.952	0.906
Average	**6.397**	**4.631**	**1.767**

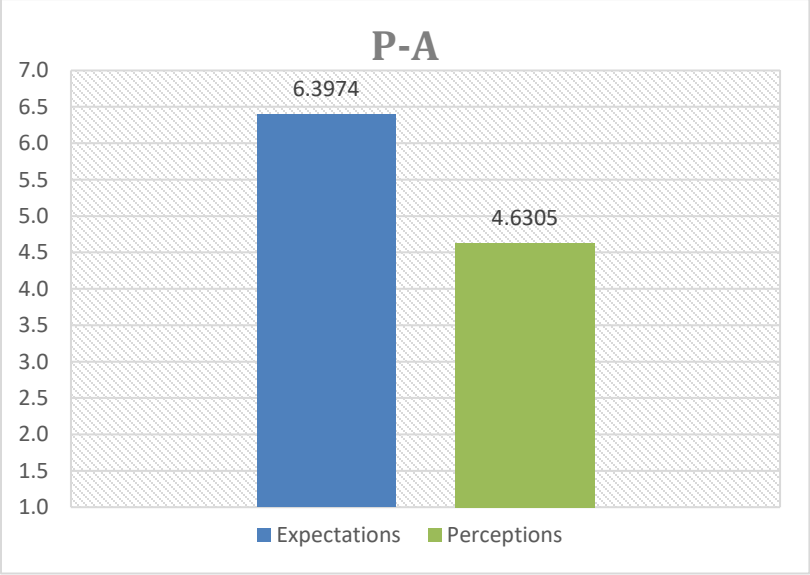

Figure 1: Average Score for the Post-Award Division

Investigators were asked to rank service quality dimensions per their perceived priority. Figure 2 summarizes their responses. The most important dimension for investigators is *reliability*

(27.84%), followed closely by *responsiveness* (26.78%). The lowest priority dimension is *tangibles* with 9.27%. This dimension had the lowest quality gap (Table 2), but its low relevance to investigator priorities limits its influence on Post-Award service quality perception. It is notable that even though *empathy* is ranked fourth in priority, the qualitative data collected shows a strong focus on this dimension as an important area for improvement in R&D Center Post-Award Division.

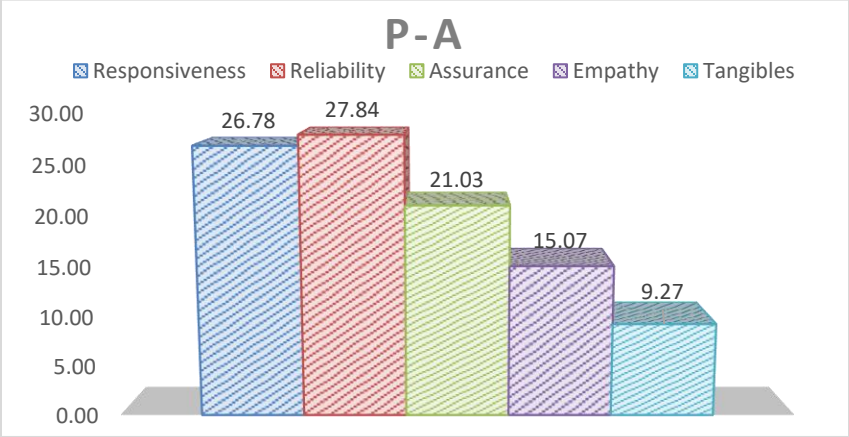

Figure 2: Quality Dimension Priority for the Post-Award Division

Weighted Average Gap Score for the Post-Award Division

Table 2 shows the weighted gap score for each dimension. This number is obtained by multiplying the average dimension gap score by the average importance weight provided by researchers in the corresponding unit survey (Figure 2).

Table 2 Weighted Average Gap Score for the Post-Award Division (n=88)

Dimension	**Gap**	**Importance Weight**	**Weighted Gap Score**
Tangibles	0.906	9.27	8.39862
Empathy	1.711	15.07	25.78477
Assurance	1.87	21.03	39.3261
Responsiveness	2.19	26.78	58.6482
Reliability	2.157	27.84	60.05088
Total			*192.20857*
Weighted Average Gap Score			*38.441714*

Post-Award Division Gap Analysis for Individual Items

Table 3 describes the individual items in each dimension for the Post-Award Division. What follows is an item analysis by dimension, incorporating the projected impact that improvement initiatives targeting these areas would have on researchers' perception of service quality. The expected impact is derived from the dimension's priority rank and the item's position above or below the unit's median gap (2.02).

Responsiveness - Priority rank: 2

The *responsiveness* dimension is composed of a time aspect (work promptness and scheduling) and an attitudinal/interpersonal aspect. In this first Post-Award dimension, all items obtained a positive gap score and a p-value of <0.001, indicating that there is a statistically significant difference between the expected service in an excellent service unit and the perceived quality of the service delivered. The lowest gap score for Post-Award *responsiveness* is 1.989, and the highest is 2.409. Consequently, all areas within this dimension are deemed critical. The items with the most room for improvement are those related to time; 1) providing a prompt service, and 2) telling researchers when a service will be performed. The items pertaining to employees' helpfulness and attitude showed slightly smaller, but still ample quality gap scores. Given the observed gap scores and high priority rank of this dimension, improvement initiatives targeting these items will have a high impact on perceived quality of service.

Reliability - Priority rank: 1

Like *responsiveness*, the *reliability* dimension is comprised of a temporal aspect (timeliness) and a professional knowledge aspect. Investigators gave this dimension the highest priority ranking. Like the *responsiveness* results, all items pertaining to Post-Award *reliability* have a p-value of <0.001, signaling a statistically significant difference between expectations for an excellent service unit and the perceived quality of the service delivered. All items have a large positive gap score threshold, and are designated as critical focus areas. The two highest gap scores belong to the items related to timeliness; 1) promising to do something by a certain time, and doing so (2.352), and 2) providing the service at the time they promise to do so (2.307). The other areas with high potential for improvement are linked to professional knowledge performing the service

right the first time (2.125), and showing a sincere interest in solving researchers' problems (2.091). All items except for "insisting on error-free documents" (1.909) exceeded the Post-Award median gap score of 2.0285. Due to the large service gap sizes and its high priority for researchers, all items within this dimension are designated as high impact areas for improvement initiatives.

Assurance - Priority rank: 3

The *assurance* dimension encompasses service quality items related to employees' knowledge, courtesy, and ability to convey trust and confidence, which lead to the development of productive working relationships. Like the previous two dimensions, all items pertaining to Post-Award *assurance* have a p-value of <0.001, signaling a statistically significant difference between the service expected in an excellent office and the perceived quality of the service delivered. All items have a large positive gap score threshold, and are designated as critical focus areas. Two of the items in this dimension are below the Post-Award gap score median (2.02), resulting in a standard "medium impact" classification, and two are above the median, raising their impact classification to "high." Critical-medium impact items for Post-Award *assurance* are: "being consistently courteous with researchers" (1.375), and "having the knowledge to answer researchers' questions" (1.739). Critical-high impact initiatives would target 1) "behavior of employees instilling confidence in researchers" (2.080) and 2) "researchers feeling confident performing transactions" (2.284).

Empathy - Priority rank: 4

The *empathy* dimension explores human interaction during the service process, focusing on the "caring, individual attention" provided by Post-Award personnel to researchers. Like the previous three dimensions, all items pertaining to Post-Award *empathy* have a p-value of <0.001, signaling a statistically significant difference between the service expected in an excellent office and the perceived quality of the service delivered. All items have a large positive gap score threshold, and are designated as critical focus areas. Three of the items fall under the Post-Award gap score median, resulting in a standard "medium impact" classification, while the two items that scored above the median are raised to "high impact" for the purpose of improvement initiatives. Within this dimension, changes to operating hours (1.375), and individualized (1.443), personal attention (1.466) to researchers are classified as a medium priority, but it is important to note that

qualitative data obtained from researcher comments indicate that the interpersonal element of the working relationship should not be ignored. Further development of the *empathy* dimension will require improvement initiatives to address the topics of "understanding the specific needs of their researchers" and "having their researcher's best interests at heart."

Tangibles - Priority rank: 5

The *tangibles* dimension encompasses physical facilities, equipment, personnel, and communication materials. This dimension obtained the smallest positive gaps for Post-Award Division, in items related to having a welcoming environment, modern looking equipment, and visually-appealing materials. However, all three of these items still have a large positive gap score threshold for "critical" designation. The smallest positive gap for the entire unit, was "employees are neat in their appearance" (0.239). All items were ranked as the lowest priority for investigators, and scored below the median gap score for Post-Award, indicating that initiatives targeting these factors will have low or limited impact on service quality perception.

Table 3: Post-Award -Item Expectation, Perception, Gap Score, and p-value by Dimension

N=88	**Exp**	**Per**	**Gap**	**T-**	**P-**
Responsiveness	**Mean**	**Mean**	**Mean**	**Value**	**Value**
Telling researchers exactly when services will be performed	6.580	4.284	2.295	9.89	<0.001
Their employees giving prompt service to researchers.	6.727	4.318	2.409	10.47	<0.001
Their employees are always willing to help researchers.	6.739	4.670	2.068	8.88	<0.001
Their employees never being too busy to respond to researchers' requests	6.341	4.352	1.989	7.84	<0.001
Reliability					
Promising to do something by a certain time, and doing so	6.523	4.170	2.352	9.99	<0.001
Showing a sincere interest in solving researchers' problems.	6.648	4.557	2.091	8.75	<0.001
Performing the service right the first time	6.420	4.295	2.125	8.93	<0.001
Providing the service at the time they promise to do so	6.523	4.216	2.307	9.61	<0.001
Insisting on error-free documents	6.511	4.602	1.909	8.99	<0.001
Assurance					
The behavior of their employees instilling confidence in researchers	6.580	4.500	2.080	8.96	<0.001

Researchers feel confident performing transactions.	6.580	4.295	2.284	9.34	<0.001
Their employees being consistently courteous with researchers	6.625	5.250	1.375	6.62	<0.001
Their employees having the knowledge to answer researchers' questions.	6.591	4.852	1.739	8.12	<0.001
Empathy					
Giving researchers individual attention	6.420	4.977	1.443	7.08	<0.001
Having operating hours convenient to all their researchers	6.205	4.830	1.375	6.25	<0.001
Having employees who give researchers personal attention	6.466	5.000	1.466	7.38	<0.001
Having their researcher`s best interests at heart	6.545	4.398	2.148	9.27	<0.001
Their employees understanding the specific needs of their researchers.	6.432	4.307	2.125	8.65	<0.001
Tangibles					
Have modern looking equipment.	5.591	4.716	0.875	5.34	<0.001
The physical environment is welcoming	5.841	4.807	1.034	5.83	<0.001
Their employees are neat in their appearance	5.830	5.591	0.239	1.59	0.115
Have user friendly materials associated with the services (web page information, documents)	6.170	4.693	1.477	7.27	<0.001

	Positive Gap Score (Deficiency)		Significant Gap

SERVICE QUALITY AREAS WITH EXPECTED IMPACT OF IMPROVEMENT INITIATIVES

Table 4 considers the gap score for each item, and link them to the dimension and priority rank they belong to. This table is provided as a reference tool for administrators and unit personnel, to allow the identification of strengths and critical areas, and assist in the prioritization of initiatives to address quality gaps.

Post-Award Division

All except one of the items for the Post-Award Division are considered critical improvement areas. For items deemed critical, the impact that improvement initiatives will have on the perceived quality of the service is determined by their corresponding priority rank and gap score size.

The Post-Award median gap score was 2.02. If an item's gap score falls under the median, its impact level is determined by the dimension's rank according to researcher priorities. If the

item belongs to a dimension with a priority rank of 5, improvement initiatives will have a Low impact in the service quality perceived by the researchers. If it has a priority rank of 3 or 4, it will have a Medium impact, and an item with a priority rank of 1 or 2 will have a High impact. If an item's gap score exceeds the median value for the unit, improvement efforts corresponding to those items increase one impact level in their classification due to the size of the quality gap.

Criteria	**Classification**
Dimension Priority Rank is 5	Low Impact
Dimension Priority Rank is 3 or 4	Medium Impact
Dimension Priority Rank is 1 or 2	High Impact
Gap score over Median	Increase one impact level

Table 4: Impact Classification Criteria for Post-Award Division Initiatives

Priority	**Dimension**	**Item**	**Gap Score**	**Impact**
5	Tangibles	Their employees are neat in their appearance	0.239	Low Impact
5	Tangibles	Have modern looking equipment.	0.875	Low Impact
5	Tangibles	The physical environment is welcoming	1.034	Low Impact
3	Assurance	Their employees being consistently courteous with researchers	1.375	Medium Impact
4	Empathy	Having operating hours convenient to all their researchers	1.375	Medium Impact
4	Empathy	Giving researchers individual attention	1.443	Medium Impact
4	Empathy	Having employees who give researchers personal attention	1.466	Medium Impact
5	Tangibles	Have user friendly materials associated with the services (web page information, documents)	1.477	Low Impact
3	Assurance	Their employees having the knowledge to answer researchers' questions.	1.739	Medium Impact
1	Reliability	Insisting on error-free documents	1.909	High Impact
2	Responsiveness	Their employees never being too busy to respond to researchers' requests	1.989	High Impact
		Median = 2.02		

2	Responsiveness	Their employees are always willing to help researchers.	2.068	High Impact
3	Assurance	The behavior of their employees instilling confidence in researchers	2.08	High Impact
1	Reliability	Showing a sincere interest in solving researchers' problems.	2.091	High Impact
4	Empathy	Their employees understanding the specific needs of their researchers.	2.125	High Impact
1	Reliability	Performing the service right the first time	2.125	High Impact
4	Empathy	Having their researcher`s best interests at heart	2.148	High Impact
3	Assurance	Researchers feel confident performing transactions.	2.284	High Impact
2	Responsiveness	Telling researchers exactly when services will be performed	2.295	High Impact
1	Reliability	Providing the service at the time they promise to do so	2.307	High Impact
1	Reliability	Promising to do something by a certain time, and doing so	2.352	High Impact
2	Responsiveness	Their employees giving prompt service to researchers.	2.409	High Impact

CONCLUSIONS

This study achieved its principal objective of addressing the identified gaps in knowledge and obtaining results that are of benefit to the research administration profession both locally and internationally. The principal achievement was the development of an adapted SERVQUAL instrument that can support continuous improvement efforts at Research Administration Centers through the assessment and evaluation of service quality levels. This instrument can be used to establish standard metrics that are comparable across institutions, facilitating and promoting the sharing of information and subsequent comparative analysis. The conclusions of the study and the applicability of the SERVQUAL instrument to research administration are based on the case study of the UPRM Research & Development Center (R&DC). Its clients completed the questionnaire to evaluate the perceived service quality of three units under study: the Proposal Development Unit (PDU), the Proposal Submission Unit (PSU), and the Post-Award Division (Accounting & Finance, Budget, Purchasing, and Human Resources offices). The data collected for this study

provides evidence of the fundamental role played by the R&D Center in safeguarding, strengthening, and promoting research at UPRM. The results presented here are those of the Post-Award Division. The importance of this role serves to highlight the necessity of offering high-quality services that allow the Center and its investigators to maximize research productivity.

The specific objectives of this research project were also attained. Through the case study, key information was obtained about the UPRM investigators' priorities and both the R&D Center's strengths and its critical areas for improvement were identified. This information was summarized in table format, and can form the basis for planning future initiatives to leverage strengths or address shortcomings. In all units, investigators prioritized the dimensions of *responsiveness* and *reliability* over all other aspects of service quality, making these the most important aspects clients are looking for in a high-quality Research Administration Center. The least-important dimension according to the quantitative data obtained was *tangibles*, but it must be emphasized that qualitative data often indicated that it still affects investigators' perception of the Center.

In Post-Award service quality evaluations, the large differences between expectations and perception scores indicate there is significant room for improvement in these offices. Due to the large gaps in service quality encountered, almost all areas of Post-Award services were deemed in critical need of improvement. The most high-impact improvements that could be made by Post-Award Division are:

- Telling researchers exactly when services will be performed (2.295).
- Providing the service at the time they promise to do so (2.307).
- Promising to do something by a certain time and doing so (2.352).
- Employees giving prompt service to researchers (2.409).

Post-Award service quality evaluations were highly critical of the time taken to perform services, duplicative paperwork requirements, and the focus on audits instead of facilitating research. Findings also point to a perceived lack of communication and trust during service interactions between researchers and Post-Award staff. Recommendations discussed include:

- Dedicating resources across all service units to matters pertaining to prompt service and communication about scheduled work.
- Optimizing processes and collecting relevant service metrics. Implementing a request-tracking system will allow offices to collect the internal data (lead time, process time, wait

time) necessary to make workflow adjustments and process changes to improve *responsiveness*.

- Developing human resources through investment in training:
    - For R&D Center staff, building knowledge about processes, improvements, and common problems, and ensuring this knowledge is successfully shared and acted upon within the organization.
    - For researchers, providing documents, templates, and tutorials that will help them navigate internal and external processes, and reduce the time it takes to complete proposal-related or project administration tasks.

The case study provided an excellent opportunity to examine the SERVQUAL instrument's strengths and weaknesses, and researchers' interactions with it, resulting in several recommendations to facilitate its continued use. Among the key concerns is the time it takes investigators to complete the questionnaire; while SERVQUAL provides a wealth of valuable data about expectations and perceptions, evaluating multiple offices at the same time can drastically multiply the time it takes to provide all the required information. In the future, it could be feasible to alternate the use of SERVQUAL and a shorter instrument that only presents the perceived quality portion. This could be done in four-year cycles to ensure the expectation data is periodically updated. A decrease in length can also help increase the response rate, which is another concern

RECOMMENDATIONS

After analyzing the quantitative and qualitative data collected via the modified SERVQUAL survey, some guidelines and areas for improvement in the various units become apparent. The following sections present these recommendations, organized by unit.

Post-Award Division

This unit is composed of four offices: Accounting & Finance, Budget, Purchasing, and Human Resources. SERVQUAL results show a high potential for improvement. To address the critical areas identified in the impact analysis as having a high impact on service quality perception, Post-Award offices can undertake the following initiatives:

- The highest priority for these offices should be reducing wait times, response times, and process times in the services offered to researchers. The perception problem in this area should be programmatically addressed by increasing process transparency and prioritizing promptness, *reliability,* and *responsiveness* in service interactions. This is a critical area that was highlighted by many investigators as an element that affects the management of project funds and the possibility of obtaining future funding.
    - A system should be implemented to obtain service metrics related to Post-Award processes, recording when service requests are received and the moment all following actions are taken. This data should then be analyzed to identify bottlenecks and necessary optimizations that would allow researchers to experience faster turnaround times and increased transparency in their Post-Award transactions. The R&D Center should consider involving faculty with subject-matter expertise in process engineering and business administration to assist with this task.
    - Evaluation of process changes should involve Post-Award staff input, to leverage their expertise and obtain their buy-in, while balancing compliance requirements against the pressing need to expedite service transactions.
    - An important step to address this problem is to clearly define the scope and expectations of each service position in Post-Award offices, while maintaining the flexibility and overlap that would allow multiple employees to perform a specific task. This would alleviate problems caused by temporary reductions in staffing due to sick leave or vacation times. In the long term, staffing levels should be evaluated considering the office workloads to determine if understaffing is a large factor affecting process times.
- SERVQUAL results indicate that investigators feel low levels of trust during their Post-Award interactions, expressed through their low confidence that services will be performed adequately and their opinion that employees should be better prepared to carry out these functions. This can be addressed through the following measures:
    - Employees should have access to extensive training opportunities related to their principal duties and be motivated to take advantage of these opportunities.

- Internal R&D Center training should focus on sharing acquired knowledge and include interactive or applied elements about common problems encountered in the administration of external funds.

- Investigators' perception of staff *empathy* dimension shows that, in general, more could be done to demonstrate that Post-Award staff have their best interests at heart. In order to have a productive working relationship with their clients, staff must communicate that they understand researchers' needs during the course of providing services and coming up with solutions that enable the successful completion of research projects. Some initiatives that can be undertaken to meet this goal are:
    - Post-Award offices should cultivate a culture that values and seeks increased process efficiency. Staff should act as facilitators during service interactions. A positive attitude and enthusiasm for assisting researchers should be fostered. Obtaining, analyzing, and acting upon service metrics is a crucial process to enable a cultural shift, as the type of metrics prioritized by leadership communicates the shared goals for the office and the R&D Center.
    - Adequate incentives should be provided to promote the adoption of a service attitude and increased productivity.
    - Offices should take steps to increase the continuity, quantity, and quality of communication with investigators, especially when there are problems with their documents or service requests. Ideally, records of these communications should be integrated into a request tracking system to facilitate consistency, continuity, and accountability. This would enable future analysis of interaction patterns to identify recurring problems and possible optimizations.
    - The R&D Center should collect and communicate evidence of the impact that its staff's work has on the development of a productive research community (Project outcomes, students involved, benefits to UPRM and its surrounding communities, etc.). This would help build a shared sense of purpose and bring to life the Center's mission and vision to staff, faculty, and administrators. Post-Award staff can communicate this knowledge and awareness of the value of UPRM research projects when interacting with investigators to build trust and demonstrate *empathy*.

- Some investigators remarked on the need for increased accountability amongst Post-Award staff. The R&D Center's current accountability mechanisms, such as formal evaluations, can be complemented with informal evaluation processes and an increased emphasis on overall service metrics. The R&D Center should consider including these metrics in its annual reports and sharing them through other (less formal) channels to demonstrate to investigators that its offices engage in continuous improvement.
- Current hardware and software solutions should be assessed to determine if, as investigators perceive, they are hindering service quality. If this is the case, better equipment and/or software should be obtained and implemented to allow more efficient performance of Post-Award functions. A formal inquiry should be carried out, as even if some options are limited by the need to interface with UPR's system-wide software there could still be efficiency gains possible in other areas.

Viable actions to improve Post-Award services in accordance with researchers' recommendations may include:

- Take steps to reduce the delay between when money is spent and when these changes are reflected in researchers' accounts.
- Improve information management across Post-Award offices through software solutions that will enable information sharing across the unit, eliminate paperwork duplication, and allow the efficient production of reports on Post-Award activity.
- Consider adjusting processes related to international students to more effectively attend to the needs that stem from their status as non-US citizens.

REFERENCES

Abil, K., Narenji-Thani, F., Mokhtarian, F., and Mehdi-Rashidi, M. (2011). Assessing quality gap of university service. *The Asian Journal on Quality, 12*(2), 167-175.

Abili, K., Thani, F. N., and Afarinandehbin, M. (2012). Measuring university service quality by means of SERVQUAL method. *The Asian Journal on Quality, 13*(3), 204-211.

Badri, M., Abdulla, M., and Al-Madani, A. (2005). Information technology center service quality Assessment and application of ServQual. *International Journal Quality & Reliability Management, 22*(8), 819-848.

Bayraktaroglu, G., and Atrek, B. (2010). Testing the Superiority and Dimensionality of SERVQUAL vs. SERVPERFT. *The Quality Management Journal, 17*(1), 47-59.

Beasley, K. L. (2006). The History of Research Administration. In E. Kulakowski, and L. Chronister, *Research Administration and Management* (pp. 9-29). Sudbury: Jones and Bartlett Publishers.

Camgoz-Akdag, H., MehvesTarım, Lonial, S., and Yatkın, A. (2013). QFD application using SERVQUAL for private hospitals: a case study. *Leadership in Health Services, 26*(3), 175-183.

Carrillat, F., Jaramillo, F., and Mulki, J. (2007). The validity of the SERVQUAL and SERVPERF scales-a meta-analytic view of 17 years of research across five continents. *International Journal of service Industry Management, 18*(5), 472-490.

Chatzoglou, P., Chatzoudes, D., Vraimaki, E., and Diamantidis, A. (2013). Service quality in the public sector: the case of the Citizen's Service Centers (CSCs) of Greece. *International Journal of Productivity and Performance Management, 62*(6), 583-605.

Cole, S. S. (2007). Research Administration as a Living System. *Journal of Research Administration, 38*(2), 14-26.

Cronin, J., and Taylor, S. (1992). Measuring service quality: a re-examination and extension. *Journal of Marketing, 56*, 55-68.

Dahan, S. M., Taib, M. Y., Zainudin, N. M., and Ismail, F. (2016). Surveying Users' Perception of Academic Library Services Quality: A case Study Univrsiti Malaysia Pahang (UMP) Library. *The Journal of Academic Librarianship*, 38-43.

Drummond, C. N. (2003). Strategic Planning for Research Admistration. *Journal of Reseach Administration, 34*(2), 4-10.

Garrard, F., and Naraya, H. (2013). Assessing obstetric patient experience: a SERVQUAL questionnaire. *International Journal of Health Care Quality Assurance, 26*(7), 582-592.

Garvin, D. (1983). Quality on the Line. *Harvard Business Review*, 65-73.

Gorringe, M., and Hochman, M. (2006). The Complexities of Managing Research Projects: An Ongoing Study of Developong a Quality Framework and Measuring Perceptions of Service Quality at UniSa. *The Journal of Research Administration, 37*(2), 113-121.

Grönroos, C. (1982). An applied service marketing theory. *European Journal of Marketing, 16*(7), 30-41.

Grönroos, C. (1984). A Service Quality Model and its Marketing Implications. *European Journal of Marketing, 18*(4), 36-44.

Jiang, J. J., Klein, G., and Crampton, S. M. (2000). A note on SERVQUAL reliability and validity in information system service quality measurement. *Decision Sciences*, 725-744.

Kakande, N., Namirembe, R., Kaye, D. K., and Mugyenyi, P. N. (2012). Strengthening Institutional Research Administration in Uganda: A Case Study on Developing Collaborations among Academic and Research Institutions. *Journal of Research Administration, 43*(1), 39-59.

Khurana, S. (2013). Service Quality Versus Customer Satisfaction in Banking Sector: A Literature Review. *The IUP Journal of Marketing Management, XII*(4), 65-78.

Killoren, R., and Eyerly, R. (1997). The Brave New World of Virtual Organization: Creation a Distributed Enviroment for Research Administration. *SRA Journal, 29*, 25-31.

Kirby, W. S. (1992). Improving productivity in sponsored research administration: New approaches and structures. *SRA Journal*, 41.

Kontogeorgos, A., Tselempis, D., and Aggelopoulos, S. (2014). Measuring service quality of the Greek Ministry of Agriculture. *Measuring Business Excellence, 18* (4), 54-64.

Ladhari, R. (2009). A review of twenty years of SERVQUAL research. *International Journal of Quality and Service Sciences*, 172-198.

Lai, F., Hutchinson, J., Li, D., and Bai, C. (2007). An empirical assessment and application of SERVQUAL in mainland China's mobile communications industry. *International Journal of Quality & Reliability Management, 24*(3), 244-262.

Lepmets, M., Cater-Steel, A., Gacenga, F., and Ras, E. (2012, June). Extending the IT service quality measurement framework through a systematic literature review. *Journal of Service Science Research, 4*(1), 7-47.

Lintz, E. M. (2008). A Conceptual Framework for the Future of Successful Research Administration. *The Journal of Research Administration, XXXIX*(2), 68-80.

Marina, S., Daviz-Hamilton, Z., and Charmanski, K. E. (2015). Evaluating Research Administration: Methods and Utility. *The Journal of Reseach Administration*, 95-114.

Mason, E., and Learned, L. (2006, May). The Role of "Development" in a Research Administration Office. *The Journal of Research Administration, 37*(1), 23-35.

Parasuraman, A., Zeithaml, V., and Berry, L. (1985). A Conceptual Model of Service Quality and Its Implictions for Future Research. *Journal of Marketing*, 41-50.

Parasuraman, A., Zeithaml, V. A., and Berry, L. (1988). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing*, *64*(1), 12-40.

Parasuraman, A., Zeithaml, V. A., and Berry, L. (1991). Refinement and Reassessment of the SERVQUAL Scale. *Journal of Retailing, 67*(4), 420-450.

Phiri, M. A., and Mcwabe, T. (2013). Customers' Expectations and Perceptions of Service Quality: The Case of Pick N Pay Supermarket Stores in Pietermaritzburg Area, South Africa. *International Journal of Research In Social Sciences, 3*(1), 96-104.

Rebolloso Pacheco, E., Cantó Andrés, P., Salvador Ferrer, C., and Fernández Ramírez, B. (2004). Analysis and amplification of the SERVQUAL in the university services. *Revista de Psicologia del Trabajo y de Las Organizaciones, 20*(3), 355-373.

Rogers, R., and Gallant, C. (2016). Transparency and How the American Recovery and Reinvestment Act (ARRA) Shaped us as Research Adminstrators. *NCURA Magazine*, 4-5.

Ronald, S., Ching-Chow, Y., and Fan, L. (2012). Capturing customer value creation based o service experience-a case study on News Cafe. *Journal of the Chinese Institute of Industrial Engineers, 29*(6), 385-399.

Sultan, P., and Wong, H. Y. (2010). Service quality in higher education- a review and research agenda. *Internatinal Journal of Quality and Service Sciences, 2*(2), 259-272.

Valentine, J. (1992). Research Administration: From Management to Marketing. *SRA Journal*, 19-25.

Yarmen, M., & Sumaedi, S. (2016). Perceived Service Quality of Youth Public Transport. *Transport Problems, 11*(1), 99-111.