

# **Importance of Responsiveness in the Quality of Service in an HVAC Maintenance Company in Metropolitan Lima Applying the SERVQUAL Model**

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## **Abstract**

The article presents the results and discussions of the application of the SERVQUAL model carried out in a company dedicated to the maintenance, installation and repair of air conditioning systems (HVAC) in Metropolitan Lima, Peru; whose objective for which the research is carried out is to identify the dimension that most impacts with respect to quality of service using the SERVQUAL model considering quality of service as the weighted sum of gaps. 91 companies were surveyed with 3 sections for each, the first of them valued the expectations that customers would have, the second the perceptions after receiving the service and in the last they scored the dimension they considered most important. The highest rated dimension or with the smallest gap is the tangible dimension with a gap of -0.35, the most important dimension according to customers is the reliability dimension with an average percentage of 24.3% and the dimension that most negatively influences the service quality index is the reliability dimension with a weighted gap of -15.69.

## **Keywords**

Quality of service, Customer satisfaction, SERVQUAL

## **1. Introduction**

Currently, to be considered competitive it is necessary to provide goods and / or services that match or exceed the expectations that the client has. Managing quality in services is a topic frequently addressed today as a differentiating factor for organizations; Because of this, strategies have been carried out so that companies can gain a competitive advantage over competitors.

Companies must retain customers by studying and discovering how to retain them to keep them over time; The satisfaction perceived by the customer and the quality offered in the service are the main antecedents of loyalty. For a company to be able to ensure its competitiveness in the service industry, it must develop and use new strategies that enable customer satisfaction and thus develop customer loyalty. In recent years, customer satisfaction has become one of the main purposes that companies seek to exploit in the long term with their customers. Based on the above, organizations need to renew and improve service quality policies to be competitive and will have to analyze the factors that enhance this variable.

The general problem is located in a deficient system which does not allow the correct measurement of the quality offered in services, this complicates the analysis and proposes opportunities for improvement that allow it to be improved, which in turn can generate the loss of customers that will negatively impact the profitability of the company, the research question that will be answered at the end of the research work is: Is the response capacity the dimension that generates the greatest impact with respect to the quality of the service?

### **1.1 Objectives**

In this way, the objective for which the research is carried out is to identify the dimension that most impacts the quality offered in the service of a Peruvian HVAC company. For this, the SERVQUAL model was used, which will allow to contrast the expectations of the client before receiving the service, against the perceptions he had later.

To achieve this, it will rely on the specific objectives, which are: determine the dimension with the greatest gap, identify the dimension that customers value most in the questionnaire, and finally, the item or question with the greatest gap. The study will be useful for the company to implement improvements that improve the level of quality of service and can direct its efforts to the most affected areas.

## **2. Literature Review**

A. Rivaldi et al. (2022) analyzed the level of satisfaction using the SERVQUAL model and the importance performance analysis. The first one will measure the quality of service of each dimension established in the research, obtaining a gap that reflects the disparity between the expectations and perceptions of the registrant. It will then be integrated with importance performance analysis to rank quality of service attributes. They concluded that there are 9 attributes found in quadrant b and c, 3 in d and none in a, they commented that the quality offered by the service must improve.

M. Akob (2021) et al. analyzed the factors that form patient loyalty, that is, involving factors related to quality of service (SERVQUAL), hospital image, the value that the patient possesses and their satisfaction in private hospitals. They concluded that, the quality offered in the service is a factor that should continue to develop and improve, considering that the services offered prioritize psychological and empathy aspects, in addition to the aspects of technical-professional attention.

Aguirre et al. (2021) studied the relationship between the quality offered in the service and user retention. At the end of the research, they concluded that there is a significantly moderate connection between the study variables.

A. Romero et al. (2020) identified the main limitations in a rehabilitation service of health centers, in which they use the SERVQUAL model that allows evaluating the quality offered of the service. Concluding that it is crucial to develop a strategy that allows the service to be competitive, this study was based on the SERVQUAL questionnaire, resulting in the dimensions that users value most in the service are security and tangibility; while the other dimensions present high levels of dissatisfaction; Therefore, health centers will seek to minimize these gaps.

S. Raza et al. (2020) explore dimensions of quality offered in the Internet banking service and the impact it has on satisfaction and loyalty to electronic customers, inspected the structural partnership between the quality offered of the Internet banking service, the electronic satisfaction presented by the user and their subsequent loyalty by decoupling the parameters. Online banking and e-services customers in Pakistan build their perceptions based on website interactivity.

C. Ko & C. Chou (2020) developed an instrument that allows evaluating the quality offered of the e-Health service in nursing homes that is based on the application of the SERVQUAL model through the elaboration of a pre-implementation analysis that combined the SERVQUAL questionnaire and the performance analysis of importance. Deficiencies in the quality of service in nursing homes were identified and the corresponding ICT applications and systems were recommended as a solution. The research detailed that the quality of care in nursing homes has continued to decline as funding and staffing resources have plummeted in recent years.

M. Umoke et al. (2020) investigated patient satisfaction with the quality of care offered in general hospitals in a state in southeastern Nigeria, using SERVQUAL. It concludes that information on patient satisfaction should be used with caution to provide a platform for renewal in the health sector because a significant part of the data is attributed to factors peculiar to patients, although they may or may not imply excellence of services in general.

M. Tobias et al. (2020) evaluated quality, thanks to the scale of the SERVQUAL model, complementing it with the gap model in a higher education institution, in turn validated the instrument to refine it through factor analysis. The result of the research reflects that there are gaps (gaps) that must be filled, in addition to applying factor analysis is useful to refine this instrument. Thanks to these methods, a greater similarity between the variables of each dimension was achieved.

Boada-Niño et al. (2019) determined the perceptions of quality in the process of care in the health sector in an institution through a descriptive study, which had a cross-sectional design in which the SERVQUAL model was applied, evaluating the 5 dimensions. The results obtained are equivalent to 70% satisfaction, validating the non-association of perception and sociodemographic characteristics. They demonstrated the importance of generating strategies that can develop a continuous improvement of the service offered.

B. Almohaimmeed (2019) investigates the effect of the quality offered in the internal service (ISQ) on the quality of the external service (ESQ), under the existence of variables such as learning organization (LO), employee satisfaction in the work environment (ES) and employee loyalty (EL). The study proposed three conceptual models of which the best was adopted, oriented on the results of indices of goodness of physical fitness. It was concluded that, the quality offered in internal service plays a fundamental role in improving the level of the job satisfaction of employees, which in turn affects the quality of external service.

A. Shafiq et al. (2019) used SERVQUAL to measure perceived quality of service in Generation Y (Gen Y) and its effects on their satisfaction with the Malaysian hotel industry. It was concluded that all dimensions of SERVQUAL are strongly correlated with customer satisfaction, four of the dimensions studied have a significant influence.

H. Murdifin et al. (2019) focused their efforts on analyzing and also investigating customer perceptions about the dimensions of retailers' service quality by presenting their results empirically, which could be useful in the elaboration of A strategy to improve service. They concluded that empathy and tangible dimensions, such as product design and lighting condition, should be prioritized, and the empathy dimension whose gap value is too prominent, such as the condition and configuration of the maximum load time. Problem solving.

A. Zun et al. (2018) assessed the degree of satisfaction and its associated factors using the SERVQUAL instrument by comparing the mean score difference between expectation and perception of the SERVQUAL dimension among patients attending IMC in Kota Bharu district, Malaysia. They defined that a large part of the users was not entirely satisfied with the services. It is therefore necessary to properly assess the gap in order to improve the service.

Gadea-Cavazos et al. (2018) adapted the SERVQUAL questionnaire to the educational sector that allowed evaluating the quality offered in the service to high school students in Nuevo León. Contrasting expectations and perceptions, they were able to conclude that there is no evidence to improve the quality of the academic program in Mexican cities with respect to physical and health activities.

S. Ali et al. (2018) compared patients' level of expectation of health care services and their perceived performance in providing information on specific service factors and the quality offered in hospital services needed to enable Meet

the needs of Indian patients. Therefore, the expectations and perception gap model can be a feedback guide to generate changes in service delivery.

A. Mejías et al. (2018) evaluated impacts of the quality offered by the service and customer satisfaction, the research study uses the instrument that uses the SERVQUAL model, the ACSI indices to evaluate customer satisfactions and the KANO model to determine the required attributes. It was possible to identify the dimensions that most impact the quality of the service, demonstrating the relationship with customer satisfaction. They concluded that the quality of the service offered by the company has an impact on customer satisfaction, allowing management to direct its efforts towards continuous improvement, using the dimensions studied.

Baffour-Awuah (2018) identified that the quality offered of the service in reference to the customer's point of view allowed and identify the influence of their satisfaction with respect to quality in an HVAC company in Ghana. In turn, it identified the 5 dimensions that most impact the quality offered by the service using the SERVQUAL model with user satisfaction, establishing the existing relationship of both. The study revealed that improving service quality goes a long way towards improving customer satisfaction in the specific industry.

O. Prentkovskis et al. (2018) detail that the requirements and needs in logistics services imply the need for a higher level of quality. Therefore, they developed a new methodology to improve quality measurement consisting of three phases. The integration of certain methods and models in the new methodology has shown greater objectivity and more accurate results in determining the quality level of sustainability processes and activities.

### **3. Methods**

The research is descriptive/correlational, because the purpose of the study is, through a previous collection of information and data, to describe the quality offered in the service by the company studied.

The total population studied is a total of 136 customers who have used the company's air conditioning services in metropolitan Lima, which correspond to the turnover of the years 2019-2022, information provided by the company. The following formula was used to calculate the representative sample.

$$n = \frac{p * Z\alpha^2 * q * N}{(N - 1) * e^2 + p * q * Z\alpha^2}$$

Where:

n: Sample size needed

N: Population studied which is 136

Z: Confidence level used at 90%

e: The maximum allowable estimate is 5%

p: Probability of occurrence the event is 50%

Q: The probability of it not happening is 50%

A total of 91 questionnaires were answered.

The instrument that served for the measurement was the SERVQUAL questionnaire, which presents standardized questions that allow quantifying the quality of the service. It presents a total of 5 dimensions (tangible elements, responsiveness, reliability, empathy and security) with statements that seek to collect and quantify through qualifying questions (1 being in total disagreement, 2 disagreeing, 3 neutral, 4 in agreement and 5 in total agreement), the expectations of a service and then collect the perceptions of the same dimensions of the service provided.

What allows to validate the veracity of the instrument used in the research, is ratified in previous studies that are based on the SERVQUAL model which was proposed by Parasuraman et al. and the immense application in various economic sectors.

Finally, the client was asked to rate the dimension of greatest importance, considering that the sum of all dimensions should be 100.

After obtaining the customer expectations and perceptions scores, the results are analyzed by comparing the dimensions, weighting the dimension that customers value most with greater weight.

The model scores are presented in the following Table 1:

Table 1: Qualification

Qualification		Description
SERVQUAL Score	=0	There is quality in the service
	>0	There is an excellent or extraordinary level of quality
	<0	There is a deficit or lack of quality (poor quality)

#### 4. Results and Discussion

100% of the items present a negative gap, which indicates that, the company does not meet the expectations of the user with the service provided by the company. It was also observed that the item with the greatest gap is item #19, which belongs to security. The element with the smallest gap is element #2, which belongs to the dimension of tangible elements.

The reliability of the responses was measured using Cronbach's Alpha, which was 0.88 for the instrument and between 0.87 and 0.88 for the items. When PCA (Principal Components Analysis) was applied, we founded 5 factors that showed Eigenvalue greater than 1, just like the original model. When applying the CFA (Confirmatory Factorial Analysis) the quotient  $\chi^2/d.f$  was 1.4 but GFI index equal to 0.81, and CFI equal to 0.85, which can be explained by obtaining Lambda values in SEM of 0.397 and 0.305 in items 5 and 18 respectively. The lower scores on certain items in the survey can be attributed to the composition of the respondents, wherein approximately 80% of them are technicians belonging to the same company. These technicians are contracted by clients to oversee the services acquired, which introduces a potential bias in the responses. Given that the majority of respondents hail from the same service-providing entity but cater to various clients, the survey responses may reflect a certain level of homogeneity or alignment with organizational norms rather than providing a diverse range of perspectives.

As a final part of the survey, the importance of each dimension according to customers was asked to obtain a weighting for each dimension, the average importance score assigned by the respondents. The most important dimension for customers is reliability. The least important dimension is that of tangible elements. With the importance assigned to each dimension, adjusted or weighted gaps were calculated. The following table was obtained:

Table 2: Calculate of weighted gaps

Weighted differences				
Dimension	Weight	Expectation	Perception	Gap
Tangible items	14.3	56.59	51.57	-5.02
Responsiveness	24.0	97.07	81.68	-15.38
Reliability	24.3	98.79	83.10	-15.69
Empathy	20.3	84.29	69.29	-15.00
Security	17.1	71.17	57.68	-13.49
	100			-64.59

Table 2 shows the average score of the item according to dimensions and gaps by dimensions. It also shows dimension-weighted scores and their respective gap.

In the Tangibles dimension, the item with the smallest gap (-0.26) is "Material elements were visually attractive and informative." This suggests that the respondents perceived the informational materials provided by the company as meeting their expectations reasonably well. On the other hand, the item with the largest gap (-0.44) is "The company's personnel had a neat appearance." This indicates that there was a notable discrepancy between respondents' expectations and their perception of the appearance of the company's personnel. This difference could be due to varying standards of neatness or grooming among respondents compared to the actual appearance of the personnel.

Moving to the Responsiveness dimension, the item with the smallest gap (-0.55) is "The company offered punctual service." This suggests that respondents perceived the company to be relatively punctual in delivering services, aligning closely with their expectations. However, the item with the largest gap (-0.74) is "The company's personnel showed willingness to help you." This indicates a significant difference between respondents' expectations and their perception of the willingness of company personnel to assist them. This difference might stem from variations in the responsiveness or helpfulness of personnel across different interactions or situations.

In the Reliability dimension, the item with the smallest gap (-0.63) is "When you had a problem or complaint, there was a sincere interest in solving it." This suggests that respondents perceived a relatively sincere effort from the company in addressing their issues or complaints. However, the item with the largest gap (-0.67) is "The company's personnel performed the service well from the first time." This indicates a notable difference between respondents' expectations and their perception of the initial performance of the service. This difference could be influenced by varying standards or experiences with service quality among respondents.

For the Empathy dimension, the item with the smallest gap (-0.58) is "The company's personnel were friendly to you." This suggests that respondents perceived the company's personnel to be generally friendly, meeting their expectations to some extent. Conversely, the item with the largest gap (-0.84) is "The company has convenient working hours for you." This indicates a substantial difference between respondents' expectations and their perception of the convenience of the company's working hours. This difference might be influenced by respondents' varying schedules or preferences regarding service availability.

Finally, in the Security dimension, the item with the smallest gap (-0.57) is "You received quick and efficient service from the company's employees." This suggests that respondents perceived the service delivery by company employees to be relatively quick and efficient, aligning well with their expectations. However, the item with the largest gap (-0.91) is "The behavior of the company's personnel conveys confidence to you." This indicates a significant difference between respondents' expectations and their perception of the confidence conveyed by company personnel. This difference might stem from variations in the demeanor or professionalism of personnel across different interactions or contexts.

It was observed that the gap with the greatest deficit was security and the dimension of tangible elements was the best scored. However, using the weight of the dimensions, it was observed that the dimension that most negatively influenced the quality-of-service index was the reliability dimension, but not the security dimension as seen with normal gaps. This is because the reliability dimension has a greater weight for customers, this being the greatest weakness of the company's service. On the other hand, according to the weighted gaps, the dimension with the best results was the dimension of tangible elements; This being its strong point.

In the current study, it was found that the item with the largest negative gap is item #19, belonging to the security dimension, with a gap of -13.49. This aligns with Baffour-Awuah (2018) finding regarding the importance of security as a critical dimension in assessing service quality. However, while Baffour-Awuah (2018) study does not provide specific information about the performance of the security dimension relative to other dimensions, in the current study it is observed that despite the security dimension having the largest gap, it is the reliability dimension that most negatively influences the service quality index, with a gap of -15.69, according to the weight assigned by customers.

Additionally, in both studies, the tangible elements dimension yielded the best results in terms of gaps. In the current study, the item with the smallest gap in this dimension was "Material elements were visually attractive and informative," with a gap of -0.26, while the item with the largest gap was "The company's personnel had a neat

appearance," with a gap of -0.44. These data suggest that while tangible elements may be a strength in the HVAC maintenance sector, the appearance of personnel may be a significant area for improvement.

## **5. Conclusion**

The study determines the most influential dimensions of the quality offered in a service, by comparing the gaps proposed by the SERVQUAL model, which was adapted to the context of the sector. With respect to the above, response capacity is not the dimension with the greatest impact; The dimension with the greatest impact is the one with reliability, having the highest negative value of the weighted gaps. The dimension with the greatest gap is security with a negative value, which means that it is what the company objectively fails the most. The dimension most valued by customers is reliability, which is why the worst valued dimension of the company, security, is not the one that most negatively impacts the quality offered by the service. Within the security dimension, it is observed that, according to the individual score per question, the company's workers do not present sufficient knowledge to react to customer questions, generating insecurity in the service provided. Compared to Baffour-Awuah (2018) study, in both cases the dimension that has the least positive impact is that of tangibles, which could be an indication of a standard in the HVAC maintenance sector, on the other hand, it was found that the tangible dimension is the best qualified, which translates into a bad focus and waste of resources in Improve the tangibles of the sector. Both studies highlight the importance of reliability and security as critical dimensions in assessing service quality in the HVAC maintenance sector. These findings suggest the need for companies in the sector to prioritize improving reliability and security in their services to enhance customer satisfaction and maintain a competitive edge in the market. It is suggested to future studies aligned with the proposed, the formulation of improvement solutions for the sector and the development of key performance indicators focused on the proposed solution.

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