El impacto de la calidad de los *e-service* en la satisfacción del cliente y su incidencia en el rendimiento financiero: caso empresa comercial Ecuatek
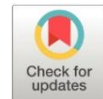
The impact of e-service quality on customer satisfaction and its impact on financial performance: the case of Ecuatek commercial company

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Resumen

Introducción: En Ecuador, las PYMES juegan un papel fundamental en la economía al generar empleo y dinamizar la actividad económica. A pesar de su contribución al desarrollo, enfrentan desafíos como limitaciones fiscales y de exportación, aunque su flexibilidad les permite adaptarse a cambios tecnológicos y sociales. **Objetivos:** el objetivo principal de este estudio es determinar la relación entre la calidad del *e-service* y el rendimiento financiero de la empresa ECUATEK (empresa comercializadora de productos tecnológicos y servicios digitales en Ecuador y acciones de comex en países como Corea, Canadá, Estados Unidos, Japón entre otros). **Metodología:** para poder medir la calidad del servicio se utilizó el Modelo SERVQUAL a través de un enfoque cuantitativo, con investigación exploratoria y descriptiva en una población infinita debido a que la empresa cuenta con más de 100.000 clientes; pero también se consideró una población complementaria que son sus empleados, por tanto, se trabajó con una participación de 14 empleados y 384 clientes como muestra. **Resultados:** estadísticamente la calidad fue medida de manera transversal, pues la variable no fue manipulada y la calidad del servicio se evaluó con encuestas en un solo momento, mientras que la rentabilidad se midió longitudinalmente en comparaciones de periodos distintos, utilizando un análisis factorial exploratorio con el fin de extraer la máxima varianza posible de los datos en cada factor. **Conclusiones:** los hallazgos permitieron establecer que la correlación entre el *e-service* y el rendimiento financiero de los clientes no fue altamente significativa, mostrando una correlación débil con el ROA (r = 0,023) y el ROE (r = -0,500) y para los empleados se mostró una relación moderada con el ROA (r = 0,354) y el ROE (r = -0,354). Se reveló que la relación entre la calidad del *e-service* y el rendimiento financiero es débil en relación con los clientes y moderada en relación con los empleados. A pesar de las limitaciones debidas a la aplicación del estudio a una única empresa, se sugiere que investigaciones adicionales podrían proporcionar una comprensión más robusta de cómo el *e-service* puede contribuir a la sostenibilidad financiera de las empresas sobre todo del sector al que pertenece la empresa del caso de estudio. **Área de estudio general:**

finanzas empresariales **Área de estudio específica:** finanzas.
Tipo de estudio: original.

Abstract

Introduction: In Ecuador, SMEs play a fundamental role in the economy by generating employment and increasing economic activity. Despite their contribution to development, they face challenges such as fiscal and export constraints, although their flexibility allows them to adapt to technological and social changes. Objectives: The main objective of this study is to determine the relationship between the quality of the e-service and the financial performance of the company ECUATEK (a company that markets technological products and digital services in Ecuador and shares of comex in countries such as Korea , Canada, the United States, Japan, among others). Methodology: in order to measure the quality of the service, the SERVQUAL Model was used through a quantitative approach, with exploratory and descriptive research in an infinite population due to the fact that the company has more than 100,000 customers; but a complementary population was also considered, which are its employees, therefore we worked with a participation of 14 employees and 384 customers as a sample. Results: Statistically, quality was measured in a cross-sectional manner, since the variable was not manipulated and the quality of the service was evaluated with surveys at a single time, while profitability was measured longitudinally in comparisons of different periods, using an exploratory factor analysis in order to extract the maximum possible variance from the data in each factor. Conclusions: The findings allowed to establish that the correlation between e-service and customer financial performance was not highly significant, showing a weak correlation with ROA (r = 0.023) and ROE (r = -0.500) and for employees a moderate relationship was shown with ROA (r = 0.354) and ROE (r = -0.354). It was revealed that the relationship between e-service quality and financial performance is weak in relation to customers and moderate in relation to employees. Despite the limitations due to the application of the study to a single company, it is suggested that further research could provide a more robust understanding of how e-service can contribute to the financial sustainability of companies, especially

in the sector to which the company in the case study belongs. General area of study: business finance Specific area of study: finance. Type of study: original.

Introduction

This research work aims to determine the quality of e-services in the ECUATEK company in the Salcedo canton and its financial performance. In Ecuador, private sector companies, such as ECUATEK, play a significant role in the national economy, contributing substantially to the Gross Domestic Product (GDP) with a growth of 2.4% in 2023; where its business activity in the technological sector not only drives the economic growth of a country, but also fosters innovation and competitiveness in the national and international market (Banco Central del Ecuador [BCE], 2024).

In Ecuador, SMEs play a fundamental role in the economy by generating employment and boosting economic activity. Despite their contribution to development, they face challenges such as fiscal and export limitations, although their flexibility allows them to adapt to technological and social changes (Aguilar, 2015).

Customer service consists of satisfying those who are looking for products or services, covering everything from pre-purchase to post-sale follow-up, since it is not just about answering questions, but also anticipating needs. Beyond kindness, it is essential to offer a high-quality and warm service (Ayay et al., 2021).

As Osejos & Merino (2020) mention, quality in e-service reflects the commitment to the customer and its importance lies in several aspects: the growing competition, the need to differentiate, the demands of more demanding customers, the impact of negative experiences on the reputation of the business and the potential to retain and attract satisfied customers through positive experiences.

Several researchers have examined service quality using the SERVQUAL model, which is frequently used in this type of studies (Murali et al., 2016; Nyadzayo & Khajehzadeh, 2016; Palese & Usai, 2018).

The SERVQUAL model in quality is the most widely used to evaluate customer service, where Bustamante et al. (2019) explain that this approach is based on the classic customer evaluation model, which assumes that the customer forms expectations about the service they will receive through various sources. Once the service is provided, the customer evaluates this service based on several dimensions that influence their perception of the service received.

This model is composed of key indicators that determine or evaluate essential aspects for calculating the quality of services in their different phases. These indicators, known as quality indicators, include:

- *Tangible elements:* This refers to how the physical appearance of the facilities, equipment, staff and communication materials reflect the quality of service.
- *Reliability:* The ability to deliver the promised service reliably and accurately.
- *Responsiveness:* The promptness and willingness of staff to assist customers and provide prompt service.
- *Security:* The competence, courtesy and ability of staff to generate trust and credibility.
- *Empathy:* The ability to offer personalized service and put oneself in the client's position.

For ECUATEK, the adoption of the SERVQUAL model is fundamental, as it allows it to comprehensively evaluate the quality of e-service from the perspective of customers and employees. By applying SERVQUAL, the company can identify areas for improvement in its digital service offering, which contributes directly to customer satisfaction and ultimately to financial performance.

E-service is a vital component for ECUATEK, as in the digital age, the online customer experience significantly influences their brand perception and purchasing decision. Therefore, ensuring high quality in e-services translates into a key competitive advantage.

Furthermore, by correlating e-service with financial performance, ECUATEK can better understand how its investments and efforts in improving digital services impact its financial results.

Methodology

The research has a quantitative approach with field research with the aim of covering a general and approximate panorama on the topic raised. This orientation is mainly adopted when the area of study is relatively unknown or little researched, which makes it difficult to formulate specific or widely applicable hypotheses (Ramos, 2008).

Descriptive research was also applied, which, as its name suggests, is used to detail the characteristics of situations, events, individuals, groups or communities under study and subject them to analysis (Garcés-Cano & Duque-Oliva, 2007). In addition, this study is non-experimental and cross-sectional, since the study variable was not manipulated (Mata, 2019). To analyze the quality of the service, a cross-sectional approach was used with surveys at a single point in time. Instead, the profitability measurement was longitudinal, collecting financial data from 2019 - 2023 (Caïs et al., 2014).

In the development of this study, two groups were counted, the first with the support of 14 employees of the company ECUATEK, to evaluate their opinion on the quality of customer service offered and the current situation of the company; the second group are the clients with a sample of 384 surveys using the formula for infinite population, carried out on both national and international clients, to determine their level of satisfaction with respect to customer service and that with online help through Google Forms the company's coverage could be met.

A structured research model was established and is illustrated in Figure 1. This model highlights three main variables of the study: e-service (customers, employees) and ROE (Return on Equity) and ROA (Return on Assets) performance. Additionally, e-service is broken down into five dimensions: tangible elements, reliability, responsiveness, trust and empathy (Guesalaga & Pita, 2014).

Figure 1

Variables studied in the research model
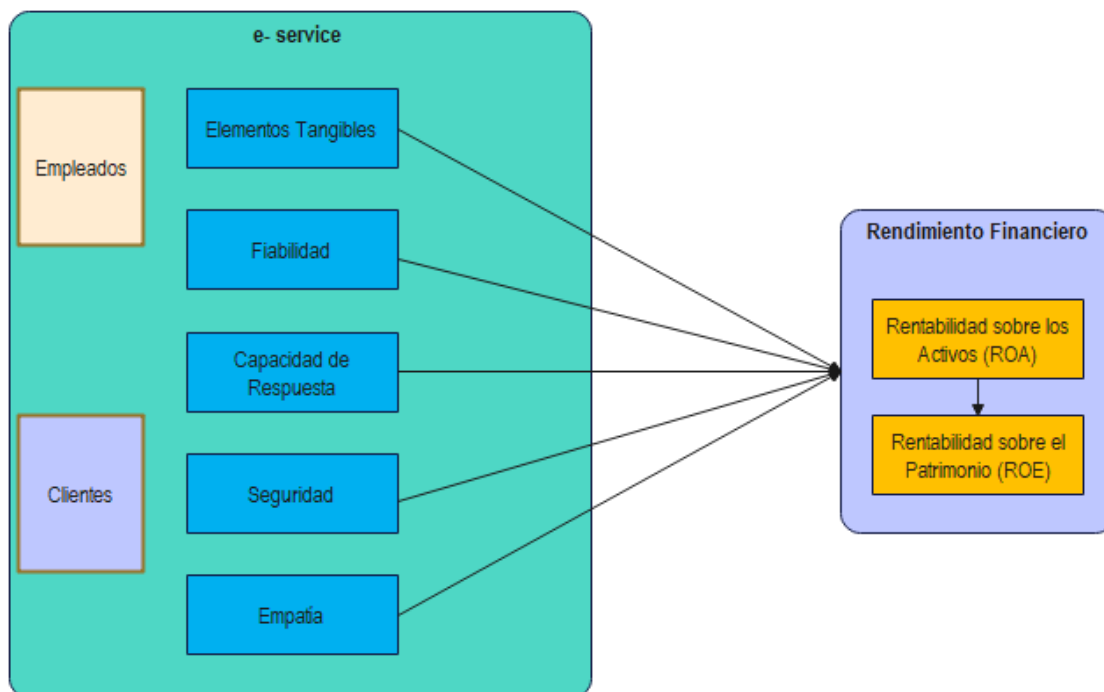
Note: The variables that make up the model are explained. Prepared by the authors based on Srivastava & Rai (2018)

The tangibles dimension refers to the appearance of employees and the company. This dimension assesses customers' initial perception of the organization's physical environment, including the equipment used to deliver the service and the layout of the facilities (Murali et al., 2016). The reliability dimension focuses on the company's ability to accurately and consistently deliver promised services, as well as the willingness of employees to deliver those services (Zhang & Hou, 2013).

The responsiveness dimension measures employees' willingness and readiness to support customers by providing fast and efficient service (Nyadzayo & Khajehzadeh, 2016). The assurance dimension focuses on the confidence that employees convey to customers through their knowledge and skills in service delivery, as well as courtesy, professionalism, technical competence, and interpersonal behavior (Murali et al., 2016). Finally, the empathy dimension focuses on the confidence that employees instill in customers through their knowledge and skills in service delivery, as well as customer service hours and policies (Zhang & Hou, 2013).

Data collection was carried out through a questionnaire divided into three sections, totaling 27 items (employees) and 28 items (customers) (see table 1). The first section includes 5 items (employees) and 6 items (customers) intended to gather basic demographic information from respondents. The second section, consisting of 22 items, seeks to understand customer perception regarding the service provided by the company. The third section contains two indicators that assess the company's financial performance (see table 1). The two sections of the questionnaire were designed using a 5-point Likert scale to measure customer perception, where the lowest value represents "totally disagree" and the highest value "totally agree" (see appendices).

Table 1

Structure of the Questionnaire based on the population segment

Items	*Section I*	*Section II*		*Section III*
	Socioeconomic profile	e-service		Financial performance
Employees	5	22	Indicators	2
Customers	6	22		

Note: Number of items per e-service and financial performance

From the first section, the first study was carried out on ECUATEK employees in sales (28.6%), administration (21.4%), technical service (28.6%), and warehouse (14.3%); regarding the percentage of participants, the number of men stands out (71.4%), compared to (28.6%) of women (n = 14). The majority are between 26 and 35 years old (78.6%) and the rest are distributed around two groups (over 46 years old 14.3% and between 36 - 45 years old 7.11%). The time worked in the company is more than five years (50%), between one and three years (35.7%) and up to one year 14.3%.

The second study was conducted with ECUATEK clients who studied online (63%) and in person (37%). Regarding the percentage of participants, the number of men stands out (59.9%), compared to 40.1% of women (n = 384). Most of them are between 26 and 35 years old (36%), 36 to 45 years old (35.7%), and the rest are distributed around two groups (over 46 years old 14.4% and under 25 years old 13.9%). The level of university studies is mostly (67.9%), followed by secondary studies (27.2%). In the occupation self-

employed (53.5%), followed by public and private dependent workers (35.2%). Purchase frequency once a month (54%), more than once a month (20.3%).

The second section allows to collect information on the service quality variable, using the Servperf model to evaluate performance (Cronin et al., 1994; Torres & Luna, 2017). This model is based on the conceptual framework of the Servqual model (Parasuraman et al., 1988).

Results

To ensure the reliability of the data collected, Cronbach's alpha coefficient was used. Table 2 presents the values of Cronbach's alpha coefficient. It was observed that the lowest value corresponds to the security variable, with 0.097 (customers) and 0.343 (employees), while the e-service variable had the highest values with 0.889 (employees) and 0.768 (customers) respectively.

Table 2

Consistency analysis of Cronbach's alpha scales

Dimensions	Number of items	Cronbach consistency (employees)	Cronbach consistency (customers)
e-service	22	0.889	0.768
Tangible elements	4	0.560	0.097
Reliability	5	0.526	0.589
Responsiveness	4	0.825	0.381
Security	4	0.343	0.347
Empathy	5	0.761	0.123

Note: Diagnosis of Cronbach's alpha

The values obtained from the Cronbach alpha coefficient indicate that only in some dimensions it has internal consistency and overall the consistency is very acceptable e-service (customers and employees) which confirmed that the scale of the questionnaire has significant reliability, since the values of Cronbach alpha exceed 0.700 (Hair et al., 2014).

The Kolmogorov-Smirnov normality test was performed because more than 50 participants were surveyed, and it was taken into account that, when $p \geq 0.05$, the Pearson parametric test is used, and when $p < 0.05$, the Spearman Rho nonparametric test is used (See Table 3).

Table 3

Variable normality test e-service

	Normality test: e-service			
Dimensions	*Kolmogorov-Smirnov (customers)*		*Shapiro-Wilk (employees)*	
	Statistical	p		
Tangible Elements:etcclient	0.167	0.000	0.887	0.072
Reliability: fcustomer	0.165	0.000	0.908	0.497
Responsiveness: crclient	0.162	0.000	0.857	0.028
Security: sclient	0.151	0.000	0.906	0.139
Empathy: e-client	0.143	0.000	0.883	0.063
e-service: tclient	0.172	0.000	0.882	0.062

Note: e-service variable normality test

Table 4 indicated that there is a p less than 0.05; therefore, it was decided to use the nonparametric test for this study.

Table 4

Variable normality test e-service

	Normality test: Performance	
Dimensions	Shapiro-Wilk	
	Statistical	p
ROA	0.906	0.493
ROE	0.880	0.312

Note: Variable normality test performance

Tables 5 and 6 show the correlation matrix based on the Spearman coefficient.

Table 5

Spearman correlation matrix of clients

Variable	etcclient	fclient	crclient	sclient	e-client	tclient	ROA	ROE
Etclient	1	,400**	,339**	,403**	,286**	,655**	,030	-,487
Fclient	,400**	1	,562**	,613**	,377**	,810**	,030	-,487
Crclient	,339**	,562**	1	,588**	,398**	,792**	,030	-,487
Sclient	,403**	,613**	,588**	1	,381**	,813**	-,007	-,498
	384	384	384	384	384	384	5	5
E-client	,286**	,377**	,398**	,381**	1	,628**	,030	-,487
	384	384	384	384	384	384	5	5
Tclient	,655**	,810**	,792**	,813**	,628**	1	,023	-,500
	384	384	384	384	384	384	5	5

ROA	,030	,030	,030	-,007	,030	,023	1	,853
ROE	-,487	-,487	-,487	-,498	-,487	-,500	,853	1

**. The correlation is significant at the 0.01 level (2-tailed).

Note:correlation matrix between dimensions of the variable

Table 6

Spearman correlation matrix employees

Variables	Tangible elements	Reliability	Responsiveness	Security	Empathy	e-service	ROA	ROE
Tangible elements	1,000	,538*	,517	,396	,343	,343	-,103	,872
Reliability	,538*	1,000	,782**	,528	,471	,471	,300	,200
Responsiveness	,517	,782**	1,000	,792**	,548*	,548*	,577	,289
Security	,396	,528	,792**	1,000	,551*	,551*	,359	-,308
Empathy	,343	,471	,548*	,551*	1,000	1,000**	,354	-,354
e-service	,343	,471	,548*	,551*	1,000**	1,000	,354	-,354
ROA	-,103	,300	,577	,359	,354	,354	1,000	,300
ROE	,872	,200	,289	-,308	-,354	-,354	,300	1,000

*. The correlation is significant at the 0.05 level (2-tailed).

**. The correlation is significant at the 0.01 level (2-tailed).

Note:correlation matrix between dimensions of the variable

The behavior of a variable is often related to the behavior of a set of variables (Tomaz-de-Aquino et al., 2018), which allows to address certain questions linked to the study in question. It is important to note that, in this section, the 22 items that constitute the research instrument are called variables. These variables are addressed following the same approach of dimensions and aspects related to e-service. Table 7 shows Bartlett's sphericity test (p < 0.000), with a sample adequacy measure of KMO = 0.767. This confirms that the data are appropriate for the sample size. Therefore, a factor analysis (Hancock et al., 2018) can be carried out to identify the number of components and assess their validity.

Table 7

KMO and Bartlett test

Kaiser-Meyer-Olkin measure of sampling adequacy		,767
Bartlett's test of sphericity	Approx. Chi-square	2210,966
	Next.	,000

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Note:KMO test and Barlett test

Tables 8 and 9 present the total variance explained, which facilitates a more detailed statistical analysis. The "total" can be seen in the section of the table called "Initial eigenvalues". This value represents the portion of the variance of the variables initially considered that is explained by each of the factors in the exploratory factor analysis.

Table 8

Total variance explained by customers

Component	Initial eigenvalues			Sums of squared charge extraction			Sums of squared charge rotations		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	4,565	20,750	20,750	4,565	20,750	20,750	3,418	15,538	15,538
2	2,024	9,201	29,951	2,024	9,201	29,951	2,247	10,215	25,753
3	1,759	7,997	37,949	1,759	7,997	37,949	2,177	9,896	35,648
4	1,442	6,555	44,504	1,442	6,555	44,504	1,770	8,045	43,694
5	1,154	5,246	49,750	1,154	5,246	49,750	1,332	6,056	49,750
6	1,121	5,096	54,846						

Note: Extraction method: principal component analysis

The eigenvalue indicates the amount of total variance explained by a factor. For example, "Factor 1" in Table 8 explains 4.565 of variance, which is equivalent to 20.75% of the total variance. For the first five factors, the eigenvalues exceed 1.000, meaning that each of these factors explains the variance of more than one variable in the study. This suggests that the original 22 variables can be reduced to 5 underlying factors. Furthermore, 49.75% of the information contained in the 22 variables can be predicted. It is important to note that the factors in the table are ordered in descending order, showing that the variance of the model is less explained by the factors at the end of the table.

Table 9

Total variance explained employees

Component	Initial eigenvalues			Sums of squared charge extraction			Sums of squared charge rotations		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	8,781	36,586	36,586	8,781	36,586	36,586	6,526	27,194	27,194
2	3,587	14,947	51,533	3,587	14,947	51,533	4,074	16,975	44,169
3	2,562	10,674	62,207	2,562	10,674	62,207	3,066	12,775	56,943
4	2,435	10,145	72,352	2,435	10,145	72,352	2,917	12,156	69,099
5	2,186	9,107	81,459	2,186	9,107	81,459	2,487	10,361	79,459
6	1,468	6,118	87,577						

Note: Extraction method: principal component analysis

The eigenvalue indicates the amount of total variance explained by a factor. For example, "Factor 1" in Table 9 explains 8.781 of variance, which is equivalent to 36.59% of the total variance. For the first five factors, the eigenvalues exceed 1.000, meaning that each of these factors explains the variance of more than one variable in the study. This suggests that the original 22 variables can be reduced to five underlying factors. Furthermore, 81.46% of the information contained in the 22 variables can be predicted. It is important to note that the factors in the table are ordered in descending order, showing that the variance of the model is less explained by the factors at the end of the table.

The rotated component matrix presented in Table 10 allows for greater discrimination of variables in relation to components. Rotation facilitates the interpretation of associations between variables and components, causing highly correlated variables to have high factor weights and variables with lower correlation to have low factor weights.

The result of the rotated component matrix led to the retention of 22 variables with the extraction of 5 components, coinciding with the total variance explained, and converging in 25 iterations. It is also observed in Table 10 that most of the variables of component 1 have factor weights greater than 0.500. In component 2 (Table 12), all variables show moderate factor weights, especially variable E28, which has a weight of 0.676; the others

with less than 0.50 are CR17, ET9, F14, F15. This pattern is similar for components 3, 4 and 5, which also show high factor weights, varying only in the number of variables that form each component, except E27, E26 which are below 0.50.

Table 10

Rotated component matrix clients

	Component				
	1	2	3	4	5
S20	0.843				
CR19	0.837				
F12	0.812				
F13	0.710				
ET7	0.607				
F11	0.554				
E28		0.676			
S21		0.669			
CR16		0.651			
CR17		0.496			
ET9		0.488			
F14		0.469			
F15		0.128			
CR18			0.841		
S22			0.825		
E25			0.270		
E27				0.636	
ET10				0.615	
S23				0.526	
E26				0.313	
E24					0.739
ET8					0.729

Note: Rotation method: Varimax with Kaiser normalization

The result of the rotated component matrix led to the retention of 22 variables with the extraction of 5 components, coinciding with the total variance explained, and converging in 25 iterations.

It is also observed in Table 11 that most of the variables of components 1,2,3,4, 5 have factor weights greater than 0.500.

Table 11

Rotated component matrix clients

	Component				
	1	2	3	4	5
ET8	0.893				
ET10	0.847				
ET9	0.828				
F12	0.813				
S22	0,800				
E27	0.696				
E24	0.686				
CR19	0.643				
F11	0.533				
F14		0.889			
S23		0.869			
CR18		0.791			
CR17		0.693			
C16		0.648			
E25			0.893		
E28			0.834		
E26			0.699		
F15				0.911	
ET7				0.701	
S21				0.627	
S20				0.563	
F13					0.866

Note: Rotation method: Varimax with Kaiser normalization

The correlations and factor analysis corroborate the interrelation between the dimensions of the service evaluated and the capacity of the questionnaire to measure underlying constructs; however, some variables are observed with a lower proportion of explained variance, which suggests the possibility of improving the instrument for future applications.

This study provides a solid foundation for the evaluation of e-service and its dimensions, offering valuable insights for improving service quality and performance; these findings can serve as a guide for future research and for the implementation of strategies to optimize e-service performance in the company.

Conclusions

- The study showed a weak correlation between e-service quality and financial performance in terms of ROA and ROE for customers, and a moderate correlation for employees, indicating that e-service influences different groups within the company differently.

- E-service quality perceptions vary between employees and customers; while customers have a moderate perception of service quality, employees show a higher variance in their responses; this could indicate a need to improve internal communication and alignment of expectations between employees and customers; the difference in perception also suggests that strategies to improve e-service should specifically address the areas highlighted by both groups.

- The application of the SERVQUAL model at ECUATEK allowed us to identify critical areas for improvement in the quality of e-service, highlighting the need to focus on key dimensions such as reliability, responsiveness, security and empathy to increase customer satisfaction and improve financial results.

- Through factor analysis, five underlying factors were identified that explain 49.75% of the variance in customer responses and 81.46% in employee responses, suggesting that the original 22 variables can be reduced to these key factors for more efficient and detailed analysis.

- Despite the high overall reliability of the variables, some of them showed a lower proportion of explained variance, indicating the need for refinement in the measurement instrument for future applications, thus improving the accuracy in the evaluation of e-service quality.

Conflict of interest

There is no conflict of interest in relation to the submitted article.

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