

# Journal of Engineering Research

## MODEL THAT PREDICTS THE QUALITY OF BANKING SERVICE IN COYUCA DE BENÍTEZ

---

*David Antonio Reyes Peña*

Professor of the Master of Competitiveness  
and Sustainability UEPI-UAGro.

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



**Abstract:** The objective of the present was: to determine a model that predicts the quality of the banking service in Coyuca de Benítez. A quantitative, non-experimental, cross-sectional and explanatory investigation was carried out. Where the target population is 983 customers who come on a fortnightly day for some service at the Bank, an unrestricted random sampling was carried out. A sample size of 155 clients was required with a sampling error of 0.075 rating units. Multiple linear regression was used to determine the factors. The results obtained show that the quality of the banking service can be predicted with the variables: Schedule rating (Reliability dimension), Security (security dimension), Friendliness (empathy dimension), Concern (responsiveness dimension) and Appearance (tangibility dimension). Explaining 66.70% of the variability. Achieving the proposed objective. With management difficulties when applying the questionnaire.

**Keywords:** Hours, Safety, Friendliness, Concern and Appearance

## INTRODUCTION

The service sector has become the most important in developed economies, both in terms of production and the volume of employment, with a notable increase since the 1970s worldwide (Becerra, 2015). In the world there are many investigations of service quality, but it is beginning to be applied to the banking sector, this represents great challenges due to the complexity of a large number of variables involved and the technological changes that are occurring with globalization (Berdugo-Correa, Barbosa-Correa, & Prada-Angarita, 2016)

Today, the increase in technological changes and innovations make service companies such as banks offer services where they are supported by these great advances, in order to be more competitive and achieve

larger market shares (2016) ( Naghi, Jorfi, Salemi, & Mansour, 2016). To create value is to generate what is valuable to the client and to achieve this it is necessary to increase the quality attributes and functionality of the service, improve the image of the company and work for a better service (Romero & Ledo, 2008).

For an organization to improve, innovate in its operational processes and technology, it is necessary to support its workers so that they offer a differentiated, optimal, agile and efficient service, this is the best guarantee to improve customer service and achieve greater coverage in the market (Ramos, Osorio, & Marcela, 2015) (Fernández, 2005). In Colombia, it begins to develop its competitiveness in its banking service, this is due to advances in technology and the growing economy, where it seeks to give added value to its services that it offers to its clients and thus satisfy their needs, seeking that of improving customer service and not letting them go with the competition (Hernández, 2015) Others, studies carried out in Venezuela, by Vilorio (2005),

Becerra (2015) frames the importance of the factors that affect the quality of service, which are: the participation of the client as co-producer of the service, the relevance of intangible and tangible elements where comfort is considered the most valued attribute. as well as safety, cleanliness and order as a quality characteristic that only avoids unfavorable perceptions (Becerra, 2015). Where Human Capital is essential for a good organization, it has to be known to motivate it, hence the importance of knowing how to select the personnel to cover the profile of the job position, looking for their performance to influence the improvement of the banking service , so that customers are satisfied with the information and services provided at the branch (Chirito & Vargas,

In the same way, in addition to Human Capital, you have to work hard on process management, where the time and movement guidelines of all your staff are framed, to avoid problems of low productivity and a bad perception of your clients (Flores & Guanine, 2013). Culture is also a factor that affects the Quality of the Banking Service, as framed by Moez et al (2016) in a study that I carry out in Islamic banks in Tunisia (Ltifi, Hikkerova, & Gharbi, 2016).

Barrantes (2016), identifies the relationship between service variables and customer satisfaction at Interbank, where he describes that service quality is related to customer satisfaction (Barrantes, 2016). When reviewing the information from banking evaluations on Service Quality, he highlights that there is not much research on modeling with multiple linear regression, which allows forecasting Service Quality, which will serve to continue developing a model with more precision and efficiency.

## METHOD DESCRIPTION

An investigation was carried out with a quantitative approach, non-experimental design, the temporality was transversal and with an explanatory scope. A pilot sample was taken to estimate the variance. The target population was the 983 people who go to the Banamex bank in Coyuca de Benítez, Guerrero on a fortnightly day for some service. Unrestricted random sampling was done, where the sample size was calculated with the following formula

$$n = \frac{N\hat{\sigma}^2}{(N-1)\left(\frac{B}{Z}\right)^2 + \hat{\sigma}^2}$$

(Scheafer, Mendenhall, & Ott, 1987)

Therefore, to calculate the sample size,  $N = 983$ , the variance, which was calculated through a pilot sample, was  $\hat{\sigma}^2 = 0.2667$ , at

95% confidence ( $Z = 1.96$ ) and a permissible error of 0.075 qualification units, so the required sample size was 154 clients of Banco de Coyuca de Benítez.

$$n = \frac{983 * 0.2667}{(983 - 1)\left(\frac{0.075}{1.96}\right)^2 + 0.2667} = 153.8012 \approx 154$$

And the sample size was:  $n \geq 151.49$

The data collection was through the survey, written and direct type. Systematic in the selection of clients, randomly taking the first client and then the questionnaire was applied to every 6 clients. The instrument that was used is a questionnaire, designed to evaluate the quality of the banking service through the internal process of the Bank.

To determine the model, multiple linear regression was performed, which studies the relationship of a dependent variable with two or more independent variables. To denote the number of independent variables, we usually use  $p$ . One of the assumptions is that the mean or expected value of  $\varepsilon$  is zero. Consequently, from this assumption it is that the mean or expected value of  $\hat{y}$ , which is denoted  $\hat{y}$ , is equal to  $\beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_px_p$ . To the equation that describes how the mean of  $\hat{y}$  and with  $x_1, x_2, \dots, x_p$  It is known as a multiple regression equation.

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \dots + b_px_p$$

where  $b_0, b_1, b_2, \dots, b_p$  are the estimates of  $\beta_0, \beta_1, \beta_2, \dots, \beta_p$  and  $\hat{y}$  = Estimated value of the dependent variable Model assumptions.

The error term  $\varepsilon$  is a random variable whose measure or expected value is 0, that is,  $E(\varepsilon) = 0$

Homoscedasticity, the variance of  $\varepsilon$ , which is denoted  $\sigma^2$ , is the same for all values of  $x$ , that is, the variance of  $y$  with respect to the regression line is equal to  $\sigma^2y$  is the same for all values of  $x$ .

The values of  $\varepsilon$  are independent, that is,

the value of  $\epsilon$  corresponding to a certain value of  $x$  is not related to the value of  $\epsilon$  for any other value of  $x$ , therefore, the value of  $y$  corresponding to a particular value of  $x$  is not related to the value of  $y$  of any other value of  $x$ .

The error term  $\epsilon$  is a normally distributed random variable. Because, and is a linear function of  $\epsilon$ , also and is a randomly distributed random variable.

#### Determination coefficient

The sum of squares could be divided or partitioned into two components: the sum of squares due to the regression and the sum of squares due to the error, that is:

$$STC = SCR + SCE$$

where

STC is the total sum of squares =  $\sum_{i=1}^n (y_i - \bar{y})^2$

SCR is the sum of squares due to regression =  $\sum_{i=1}^n (\hat{y}_i - \bar{y})^2$

SCE is the sum of squares of the error =  $\sum_{i=1}^n (y_i - \hat{y}_i)^2$

Therefore, the goodness of fit of the estimated regression equation of the coefficient of multiple determination  $R^2$  was calculated using the following quotient.

$$R^2 = \frac{SCR}{SCT}$$

This coefficient is interpreted as the proportion of the variability in the dependent variable that is explained by the estimated regression equation. By multiplying this result by 100, it is interpreted as the percentage of the variability in and which is explained by the estimated regression equation.

#### Significance test

The significance test in multiple linear regression is used to determine if there is a significant relationship between the dependent variable and the set of independent variables, using Fisher's F statistic, this test is called the global significance test.

Where:

$$F = \frac{CMR}{CME}$$

$$CMR = \frac{SCR}{P} \quad y \quad CME = \frac{SCE}{n - P - 1}$$

The hypothesis of the F statistic is:

$$H_0: \beta_1 = \beta_2 = \dots = \beta_p = 0$$

$H_a$ : one or more of the parameters are not equal to zero

The rejection region using the p-value is: Reject  $H_0$  if the p-value  $\leq \alpha$

The region of rejection using the critical value is: Reject  $H_0$  Yeah  $F \geq F_\alpha$ , where  $F_\alpha$  belongs to the F distribution with  $p$  degrees of freedom in the numerator and  $np-1$  degrees of freedom in the denominator.

If the F test indicates that there is global significance, the t test is used to identify whether each of the independent variables are significant, using the following statistic

$$t = \frac{b_i}{S_{b_i}}$$

The Statistical Hypothesis you is

$$H_0: \beta_i = 0$$

$$H_a: \beta_i \neq 0$$

Reject rule: Reject  $H_0$  if the p-value  $\leq \alpha$

Using the critical value method, we reject  $H_0$  Yeah  $t \leq -t_{\alpha/2}$  or if  $t \geq t_{\alpha/2}$ , where you  $\alpha/2$  is a value of the distribution you with  $np-1$  degrees of freedom.

In multiple regression, most of the independent variables have a degree of correlation between them, where multicollinearity refers to the correlation between the independent variables (Anderson, Sweeney, & Williams, 2008) (Montgomery, Peck, & Vining, 2011). , (Acuña, 2011), so it is essential to observe the existence of multicollinearity.1

$$FIV_i = \frac{1}{1 - R_i^2} \quad \text{As well as the statistic } T_i = \frac{1}{FIV_i} = 1 - R_i^2$$

Collinearity problems are considered if some  $FIV$  is greater than 10, which corresponds to some  $R^2_i > 0.9$  and  $T_i < 0.1$ . For Belsley (1991) condition indices between 5

Fountain	sum of squares	Degrees of freedom	middle square	F
Regression	SCR	p	$CMR = \frac{SCR}{p}$	$F = \frac{CMR}{CME}$
Mistake	SCE	n-p-1	$CME = \frac{SCE}{n-p-1}$	
total	SCT	n-1		

Table 1: Obtaining the ANOVA

Table 1 shows the concentration of information for the analysis of variance.

	Half	Deviation typical
What rating do you give to the service received?	8.5130	.51433
The comfort of the waiting chairs during the service	8.7208	.65176
The cleanliness of the facilities	8.7013	.94371
The internal temperature inside the bank	8.7338	.63701
The appearance of the workers	8.8117	.55742
The security of your transactions in the service of this bank	8.6688	.57229
The promises that the employees made to do it at a certain time and were fulfilled	7.8039	.84063
If employees show interest in solving your problems	8.5325	.55033
Rate the service you received the first time you visited this bank	8.5584	.55996
Rate the service you receive at the entrance of the bank	8.3961	.68043
Rate security within the bank	7.3247	.76597
Rate security outside the bank	6.2662	.98380
The security you feel about the information you receive from bank employees	8.3571	.64351
Rate the speed of service employees provide	7.7318	.87826
Rate the willingness of employees to answer your questions	8.5260	.55067
Rate the trust that employees transmit to you	8.5390	.52559
Rate employee understanding of your specific needs	8.5065	.53927
Rate the employees' concern for you.	8.4545	.51247
Rate the personalized service offered by the bank	8.4416	.52377
Rate the service hours offered by the bank	8.4610	.54990
Rate the friendliness of the staff who deliver the shifts	8.4481	.53678

Table 2: descriptive analyzes of the items

Model	R.	r squared	corrected r squared	typ. error of the estimate	change statistics				
					Change in R squared	change in F	gl1	gl2	Next Change in F
5	.817	.667	.656	.30172	.011	4,734	1	148	.031

Table 3: Summary of the model

and 10 are associated with weak collinearity, while condition indices between 30 and 100 indicate moderate to strong collinearity.

It is desirable that the tolerance be as large as possible, ideally equal to one, and in general that it be greater than 0.04 Results

The result of table 2 shows that the best qualification was the appearance of the workers with 8.8, followed by the internal temperature of the bank, comfort of the chairs and cleanliness of the facilities with 8.7. Unlike security outside the bank with 6.2, followed by security within the bank with 7.3 and the speed of service that employees offer with 7.7.

Table 3 shows the result of the goodness of fit of the model, which shows that the proportion of variability in the dependent variable that is explained by the estimated regression equation, that is, the estimated regression equation explains a 66.7% the variability of  $\hat{Y}$ , where  $\hat{Y}$  is the estimated service quality.

The result of the analysis of variance shown in table 4 indicates that one or more of the parameters are statistically different from zero, since the null hypothesis is rejected at the significance level of 0.05.

Table 5 shows the result of collinearity, which was observed that there are no collinearity problems, since the tolerance is greater than 0.4 and the FIV is less than 10, as framed by Belsley, (1991). The coefficients of the variables of the estimated regression equation are also observed.

When substituting the variables in the estimated regression equation, it is as follows:

$Y = \text{Bank Service Quality.}$

$C = (\text{Constant})$

Hours = Rate the service hours offered by the bank (Reliability Dimension)

Security = The security of your transactions in the service of this bank (Security dimension)

Friendliness = Rate the friendliness of the staff who deliver the shifts (empathy

dimension)

Concern = Rate the concern of the employees for you (capacity dimension response)

Appearance = The appearance of the workers (dimension of tangibility)

Therefore, the equation of the estimated multiple regression is:

$Y = -0.395 + 0.333 * \text{Schedule} + 0.178 * \text{Safety} + 0.239 * \text{Kindness} + 0.182 * \text{Concern} + 0.112 * \text{Appearance}$

## RESULTS AND CONCLUSIONS.

The best qualifications were presented in the tangible dimensions, such as the appearance of the workers, internal temperature of the bank, comfort of the chairs and cleanliness, and the lowest qualifications, in order of how they were presented, were insecurity outside and inside the bank. , the speed that employees offer the service, similar results are framed by Romero and Ledo (2008) Becerra (2015).

Regarding the goodness of fit of the estimated regression model, it obtained a percentage above 66%, which is a good estimate. With respect to the ANOVA, which indicates that there is at least one parameter  $\beta_i$  which is different from zero, since the null hypothesis is rejected. Regarding collinearity, it meets the tolerance. The results obtained show that the quality of the banking service can be predicted with the variables: qualification of the hours of the service offered by the bank, the security in their transactions in the service of this bank, the qualification of the friendliness of the personnel who deliver the shifts. , the rating given to the employees' concern for you, and the appearances of the workers, with 66.7% of explained variance.

These results reflect that the variables found are related to the dimensions of Service Quality framed by the SERVQUAL Model (Zeithaml, Parasuraman, & Berry, 1990). Where the Reliability dimension is

Model		sum of squares	gl	root mean square	F	Next.
5	Regression	27,000	5	5,400	59,317	.000e
	Residual	13,474	148	.091		
	Total	40,474	153			

Table 4: ANOVA

coefficients									
variables	Unstandardized coefficients		Coefficient is standardized	you	Next.	95.0% confidence interval for B		Collinearity Statistics	
	B.	Mistake typ.				Beta	Limit lower	Limit superior	tolerates ncia
(Constant)	-.395	.549		-.719	.473	-1,479	.690		
Rate the service hours offered by the bank	.333	.069	.356	4,831	.000	.197	.470	.414	2,418
safety in your transactions in the service of this bank	.178	.052	.198	3,441	.001	.076	.280	.679	1,473
Rate the friendliness of staff delivering shifts	.239	.067	.250	3,549	.001	.106	.373	.454	2,201
Rate the employees' concern for you.	.182	.058	.181	3,122	.002	.067	.297	.668	1,497
The appearance of the workers	.112	.051	.121	2,176	.031	.010	.214	.724	1,382
to. Dependent variable: What rating do you give to the service received?									

Table 5: Collinearity and coefficients of the model variables

represented by the service hours offered by the bank, the Security dimension is represented by the transactions in the banking service, the Empathy dimension is represented by the friendliness of the staff who deliver the shifts , the dimension of responsiveness is

represented by the concern of employees for customers and the dimension of tangibility is represented by the appearance of workers. With the results obtained, the objective of this study was achieved.

## REFERENCES

- ACUÑA , E. F. (2011). *ANÁLISIS DE REGRESIÓN*. CD. DE MÉXICO: UNIVERSIDAD DE PUERTO RICO.
- Anderson, D. R., Sweeney, D. J., & Williams, T. A. (2008). *Estadística para administración y economía*. México, D.F.: CENGAGE Learning.
- Barrantes, M. C. (2016). Calidad de servicio y la satisfacción de los clientes del banco interbank del distrito de Molina periodo 2012-2014. *Universidad INCA Garcilaso de la Vega Nuevos Tiempos, Nuevas Ideas*.
- Becerra, C. E. (2015). Incidencia de la calidad en servicio en el incremento de la productividad en una institución bancaria privada de la ciudad de Pacasmayo. *Universidad Nacional de Trujillo*.
- Belsley, D. A. (1991). *Conditioning Diagnostics: Collinearity and Weak Data in Regression*. John Wiley & Sons.
- Berdugo-Correa, C. R., Barbosa-Correa, R. A., & Prada-Angarita, L. M. (2016). Variables relevantes para la medición de la calidad percibida del servicio bancario. *DYNA*, pp 213-222.
- Chirito, E. K., & Vargas, R. (2014). Incidencia de la calidad de servicio en el incremento de la productividad en una institución bancaria privada de la ciudad de Pacasmayo. *Universidad Nacional Jose Faustino Sanchez*.
- Fernández , M. J. (2005). La innovación como factor de calidad en las organizaciones educativas. *Educación XXI*, pp 67-86.
- Flores , S. J., & Guanina, V. E. (2013). La gestión por procesos y su relación en la calidad del servicio al cliente, de la cooperativa de ahorro y crédito san francisco ltda. matriz ambato. *Universidad técnica de ambato facultad de contaduría y auditoría*.
- Hernández de Velazco, J., Chumaceiro, A. C., & Atencio, E. (2009). Calidad de servicio y recurso humano: caso estudio tienda por departamentos. *Revista Venezolana de Gerencia*, pp 457-470.
- Hernández, A. P. (2015). Liderazgo en la gestión del servicio en una entidad bancaria en Colombia. *Ciencias economicas Universidad militar nueva granada*.
- Ltifi, M., Hikkerova, L., & Gharbi, J. (2016). Los determinantes de la elección de los bancos islámicos en Túnez. *Revista internaiconal de Marketing bancario*, pp 710-730.
- Montgomery, D. C., Peck, E. A., & Vining, G. G. (2011). *Introducción al análisis de regresión lineal*. Cd de México: Grupo editorial patria.
- Naghi, A. M., Jorfi, S., Salemi, R., & Mansour, H. (2016). El estudio de los efectos de los servicios de banca electrónica calidad en la satisfacción y fidelidad de los clienres. *Journal of current research in science*, pp 375-381.
- Ramos, S., Osorio, L., & Marcela , D. (2015). Propuesta de mejoramiento para el área de servicio al cliente del banco caja social oficina chipichape Cali. *Universidad de San Buenaventura - Cali*.
- Romero, I., & Ledo, M. (2008). Elevación de la calidad en los servicios a partir de la interrelación clientes internos y externos. *Ingeniería Industrial*, Vol XXIX núm. 3 pp 1-7 .
- Scheafer, R. L., Mendenhall, W., & Ott, L. (1987). *Elementos de musetreo*. México, D.F.: Grupo Editorial Iberoamérica S.A. de C.V.
- Viloria, N. (2005). Factores que inciden en el sistema de control interno de una organización. *Actualidades contables faces*, pp 87-92.

Item	Qualification
service environment	
The comfort of the waiting chairs during the service	
The cleanliness of the facilities	
The internal temperature inside the bank	
The appearance of the workers	
reliability	
The security of your transactions in the service of this bank	
The promises that the employees made to do it at a certain time and were fulfilled	
If employees show interest in solving your problems	
Rate the service you received the first time you visited this bank	
Rate the service you receive at the entrance of the bank	
Rate security within the bank	
Rate security outside the bank	
The security you feel about the information you receive from bank employees	
Interaction quality	
Rate the speed of service employees provide	
Rate the willingness of employees to answer your questions	
Rate the trust that employees transmit to you	
Empathy	
Rate employee understanding of your specific needs	
Rate the employees' concern for you.	
Rate the personalized service offered by the bank	
Rate the service hours offered by the bank	
What rating do you give to the service received?	
Rate the friendliness of the staff who deliver the shifts	

Questionnaire used on a scale of 0 to 10