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Multivariate modeling to assess user satisfaction in university libraries

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Abstract

University libraries face challenges in the digital age to meet the evolving expectations of users. Although there are studies on user satisfaction, few have applied a multivariate model to examine how various variables interact to affect this satisfaction. The purpose of the study was to evaluate the level of user satisfaction at the Pontificia Universidad Católica del Ecuador, using a multivariate model. A quantitative, correlational, comparative approach with a cross-sectional design was employed. The sample included 365 individuals, among students and professionals. A measurement instrument, reviewed by experts, was used and the application was conducted virtually. Analyses were carried out using SPSS and AMOS, applying reliability analysis, principal components, and structural equations. The results showed high satisfaction coefficients in all the evaluated dimensions, highlighting the importance of specialized staff, up-to-date bibliographic resources, adequate infrastructure, and a robust computer system in the perception of service. It is concluded that the multivariate model was effective in assessing and improving user satisfaction, highlighting that the library services offered by the university are considered excellent by both students and teachers and defining key areas for future interventions.

Keywords: University libraries; user satisfaction; multivariate modeling; library management; service quality.

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Modelado multivariante para evaluar la satisfacción de usuarios en bibliotecas universitarias

Resumen

Las bibliotecas universitarias enfrentan desafíos en la era digital para satisfacer las expectativas cambiantes de los usuarios. Sin embargo, aunque existen estudios sobre la satisfacción del usuario, pocos han aplicado el modelo multivariante para examinar cómo interactúan diversas variables para afectar esta satisfacción. El propósito del estudio fue evaluar el nivel de satisfacción de los usuarios en la Pontificia Universidad Católica del Ecuador, mediante un modelo multivariante. Se empleó un enfoque cuantitativo, correlacional y comparativo con un diseño transversal. La muestra incluyó a 365 individuos, entre estudiantes y profesionales. Se utilizó un instrumento de medición revisado por expertos y la aplicación se realizó virtualmente. Los análisis se llevaron a cabo con SPSS y AMOS, aplicando análisis de confiabilidad, componentes principales y ecuaciones estructurales. Los resultados mostraron altos coeficientes de satisfacción en todas las dimensiones evaluadas, destacando la importancia del personal especializado, los recursos bibliográficos actualizados, una infraestructura adecuada y un sistema informático robusto en la percepción del servicio. Se concluye que el modelo multivariante fue efectivo para evaluar y mejorar la satisfacción del usuario, resaltando que los servicicos bibliotecarios ofrecidos por la Universidad son considerados de manera excelente tanto por estudiantes como profesores y definiendo áreas clave para futuras intervenciones.

Palabras clave: Bibliotecas universitarias; satisfacción del usuario; modelado multivariante; gestión bibliotecaria; calidad de servicio.

Introduction

University libraries are essential pillars in higher education, providing critical resources that support learning and research (Ellis, Johnson & Rowley, 2017; Adekoya, 2023; Jayamma, Mahesh & Kotur, 2023). However, as the digital age progresses, these institutions face significant challenges in meeting the evolving expectations of users (Meesad & Mingkhwan, 2024). Multivariate modeling emerges as a powerful tool to assess and improve user satisfaction, enabling a comprehensive analysis of multiple factors that influence their perception and experience.

Historically, university libraries have been valued for their ability to provide access to vast information resources (Halpin et al., 2015; Bandyopadhyay & Boyd-Byrnes, 2016; Onunka et al., 2023). Previous studies have shown that user satisfaction is affected not only by the availability of resources but also by the quality of service, staff competence, and technological infrastructure (Kettinger & Lee, 1994; Andrade, 2003; Morillo & Morillo, 2016; Angamarca, Díaz & Martínez, 2020; Silva et al., 2021; Abdullahi & Owolabi, 2022). However, with the advent of digital technologies, the nature and accessibility of these resources have evolved, demanding a transformation in the libraries' mode of operation (Martzoukou, 2021; Meesad & Mingkhwan, 2024).

Despite technological advances, many university libraries struggle with limitations related to outdated information management systems (Rahman, Mohammed & Bin, 2024), a lack of adequate training for staff in new technologies, and infrastructure issues that hinder an optimal user experience (Ketheeswaren, 2025). Additionally, the lack of effective integration of digital tools has led to the underutilization of available resources, affecting satisfaction and knowledge retention

among students and scholars (Mathew & Raju, 1981).

In this context, although research on user satisfaction in university libraries is abundant, there is a shortage of studies that use multivariate methods to understand how multiple variables interact and affect this satisfaction. Most studies focus on individual aspects such as digital access or staff competence, without offering an integrated approach that considers all variables together (Bawden, 2001; Rafi, JianMing & Ahmad, 2020).

Therefore, the general objective of this research is to assess the level of satisfaction of students and professionals at the Pontificia Universidad Católica del Ecuador, using a multivariate model. To achieve this objective, the following alternative hypotheses are proposed:

H1: There is a significant positive evaluation between the training of specialized staff and the overall user satisfaction in university libraries.

H2: The quality and updating of bibliographic resources directly influence user satisfaction.

H3: Adequate infrastructure and a robust computer system are strongly correlated with high levels of user satisfaction.

H4: The effective integration of digital technologies in library operations is associated with an improvement in user satisfaction.

1. Methodology

The research adopted a quantitative, correlational, and comparative approach, using a cross-sectional design to assess user satisfaction at the Pontificia Universidad Católica del Ecuador, Santo Domingo campus. The sample consisted of 365 individuals, including students and professionals, with a gender distribution of 43% men and 57% women, and a composition of 31.5% faculty and 68.5% students. The sample selection was carried out through finite probabilistic sampling, ensuring a confidence level of 95% and a margin of error of 5%.

The measurement instrument was initially designed by librarian professionals with a master's degree. It was subsequently reviewed and rated by four experts with Ph.D. degrees from European and American backgrounds. The application of the instrument was conducted virtually using the Google Forms platform, from June 12 to July 30, 2024, corresponding to the 2024 academic period.

The instrument was designed following the guidelines of the Ecuadorian Council for the Assurance of Higher Education Quality (CACES), considering criteria such as institutional conditions, infrastructure, and library management. The evaluated elements are presented in Figure I and include: Research and community engagement (8 items), specialized staff (6 items), bibliographic resources (7 items), physical and digital holdings (5 items), use and quality of service (5 items), infrastructure (8 items), and computer system (7 items). Each item used a Likert scale from 1 (very dissatisfied) to 5 (very satisfied), according to the standards of Iqbal & Rafiq (2023).
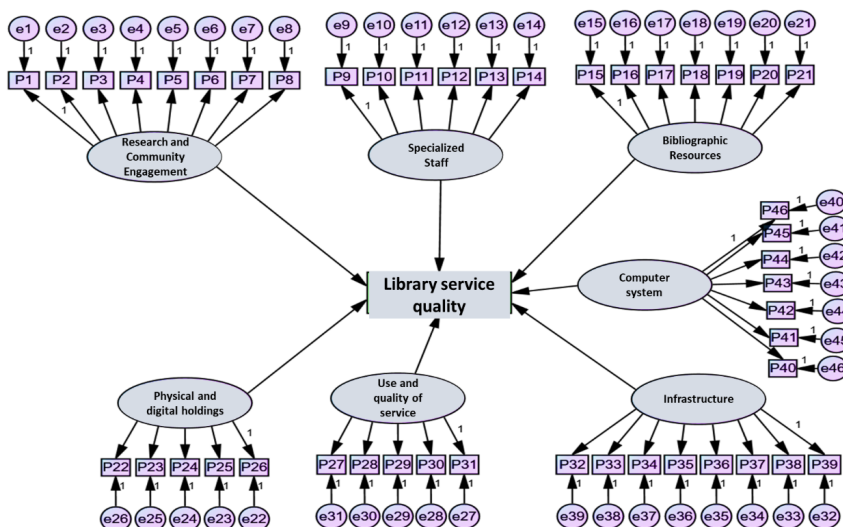
Source: Own elaboration, 2024.
Figure I: **Neural Networks for Satisfaction Factors in a University Library Center**

Data analysis was performed using SPSS version 25 and AMOS version 24. In SPSS, reliability was assessed using Cronbach's alpha coefficients and McDonald's Omega, along with a principal component analysis and Bartlett's test of sphericity (KMO). With AMOS, neural networks were developed to identify observed and latent variables, incorporating error margins (Lima, Cândido & D'Amorim, 2020; Manoharan, Ashtikar & Nivedha, 2024). The models were adjusted using indices such as CFI (>0.95), RMR (<0.08), and RMSEA (<0.06), and were validated with tests of validity and reliability (Tristán & Pedraza, 2017).

2. Results and discussion

In this section, the results of user satisfaction at the university library are presented. The reliability analyses and factor loadings of the different library satisfaction constructs provide a comprehensive view of the quality of services offered. Table 1 presents the results obtained on user satisfaction at the university library through reliability analysis.

Table 1
Reliability analysis: Cronbach's Alpha and McDonald's Omega for library satisfaction elements

Library Quality Satisfaction Elements in University	Reliability Statistics		
	Cronbach's Alpha	McDonald's Omega	Number of Items
Research and Community Engagement	0,966	0,966	8
Specialized Staff	0,963	0,963	6
Bibliographic Resources	0,938	0,936	7

Cont... Table 1

Physical and Digital Holdings	0,935	0,937	5
Use and Quality of Service	0,920	0,921	5
Infrastructure	0,950	0,949	8
Computer System	0,942	0,942	7
Total	0,985	0,985	46

Source: Own elaboration, 2024.

Reliability results demonstrated high consistency in the instruments used to measure satisfaction in the university library, with coefficients exceeding 0.90 across all dimensions. The research and community engagement dimension exhibited a Cronbach's alpha and McDonald's omega of 0.966, highlighting the role of library support in promoting research. The training of staff reached a coefficient of 0.963, reflecting its significance for the implementation of advanced technologies.

The quality and updating of bibliographic resources (0.938 and 0.936) and the integration of physical and digital holdings (0.935 and 0.937) ensured equitable access to information. Furthermore, the use and quality of services (0.920 and 0.921), the adequacy of the infrastructure (0.950 and 0.949), and the robustness of the computer system (0.942) were critical for continuous improvement and user satisfaction.

The factor loadings obtained through principal component analysis and maximum likelihood, presented in Table 2, demonstrate a high explanatory capacity of the evaluated elements. In the research and community engagement dimension, loadings ranged from 0.880 to 0.919, underlining their importance in the student educational process, in line with studies that emphasize the central role of libraries in knowledge generation and transfer (Skyrme, 2001; Pickton, 2016). Specialized staff showed loadings between 0.907 and 0.941, which confirms the relevance of continuous training to implement advanced technologies that optimize service quality, as postulated by theories of organizational learning (Dochy et al., 2021) and quality improvement (Durana et al., 2019).

Table 2
Factor Loadings for the Items of library quality satisfaction constructs

No.	E1	No.	E2	No.	33	No.	E4	No.	E5	No.	E6	No.	E7
P1	0,894	P9	0,907	P15	0,759	P22	0,843	P27	0,781	P32	0,836	P40	0,793
P2	0,919	P10	0,938	P16	0,819	P23	0,926	P28	0,907	P33	0,897	P41	0,895
P3	0,885	P11	0,899	P17	0,846	P24	0,948	P29	0,936	P34	0,906	P42	0,851
P4	0,919	P12	0,941	P18	0,881	P25	0,926	P30	0,870	P35	0,891	P43	0,811
P5	0,893	P13	0,923	P19	0,912	P26	0,816	P31	0,868	P36	0,867	P44	0,889
P6	0,887	P14	0,910	P20	0,876					P37	0,804	P45	0,928
P7	0,911			P21	0,911					P38	0,796	P46	0,921
P8	0,880									P39	0,879		

Nota: E1 = Research and Community Engagement; E2 = Specialized Staff; E3 = Bibliographic Resources; E4 = Physical and Digital Holdings; E5 = Use and Quality of Service; E6 = Infrastructure; E7 = Computer System.
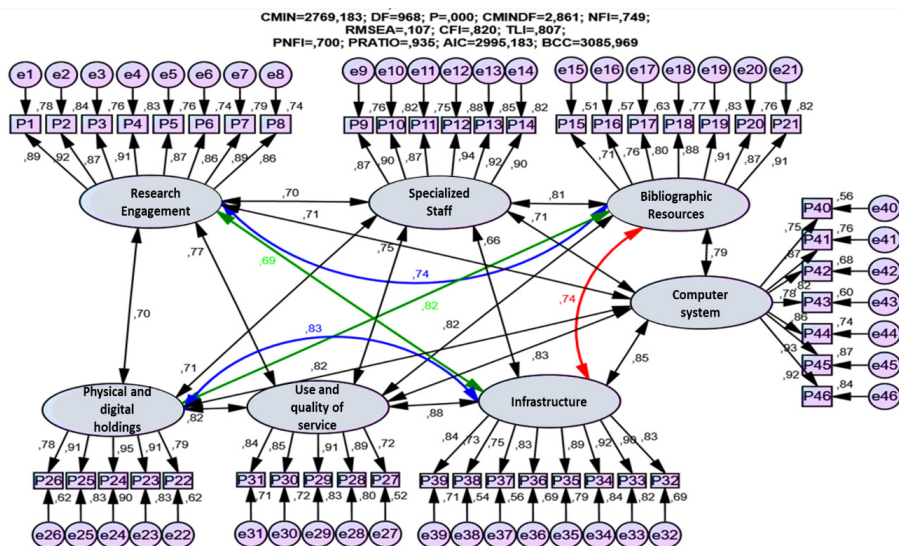**Source:** Own elaboration, 2024.

Bibliographic resources and physical and digital holdings recorded loadings between 0.759-0.912 and 0.843-0.948, respectively, reflecting the need for constant updates to meet academic demands. This finding aligns with resource management, which emphasizes availability as a competitive advantage (Hamadamin & Atan, 2019). Additionally, recent studies highlight the relationship between accessibility and perceived quality of library service (Kato, Kisangiri & Kaijage, 2021; Henss & Pinquart, 2023).

Finally, the loadings for use and quality of service (0.781-0.907), along with library infrastructure (0.836-0.928) and the computer system (0.793-0.921), emphasize the importance of continuous evaluation and robust infrastructure to enhance the user experience. These results are consistent with theories of continuous improvement and systems, which underscore regular review and operational efficiency as keys to satisfaction and institutional quality (Von Bertalanffy, 1972; Galyani & Moballeghi, 2008).

Figure II presents the structural equations to assess the level of satisfaction of users of the university library. The results confirm that the employed structural equations possess adequate predictive and explanatory capacity for assessing user satisfaction in the university library.

Source: Own elaboration, 2024.
Figure II: **Structural Equations of Satisfaction Elements for a University Library Center**

The CMIN/DF value of 2.861, within the acceptable range, supports the quality of the model fit, in accordance with previous studies on structural equation analysis in educational and library contexts (Zhang, 2019; Habibi, Yaakob & Sofwan, 2022).

Furthermore, the AIC and BCC indices, with low values, reinforce the excellence of the model, highlighting the relevance of these measures to ensure the validity and reliability of the results, as documented by Uluskan (2023) in AMOS applications.

The analysis of factor loadings revealed high coefficients in all evaluated elements, including research and community engagement, specialized staff, bibliographic resources, physical and digital holdings, use and quality of service, infrastructure, and computer system. These results reflect a strong valuation among the indicators and latent constructs, underscoring the importance of each element in the perception of the quality of library service (Hou et al., 2024). The integration of these factors, such as the presence of trained staff and updated resources, enhances user satisfaction, aligning with the findings of Tait, Martzoukou & Reid (2016); and, Ashaye & Irani (2019), who highlight the synergistic interaction between multiple service dimensions.

Table 3 presents the weights of the estimated coefficients for the different satisfaction elements in the university library. The multivariate modeling of librarian user satisfaction identified significant estimators with low standard errors and critical ratios above 3.00, ensuring the significance and reliability of the results. The factor loadings for Research and Engagement, ranging from 1.001 to 1.118, highlight its role in the perception of quality, aligning with studies that emphasize the importance of academic engagement in university libraries (Hong et al., 2002; Ojennus & Watts, 2017).

Table 3
Behavior of coefficient Weights in multivariate modeling

Item	Element	Estimate	S.E.	C.R.	P
P1 How satisfied are you with the university library as a place for learning, research, and engagement?	Research Engagement	1			
P2 How satisfied are you with the library as a place for learning and research?	Research Engagement	1,085	0,059	18,320	***
P3 How would you rate the library as a center for connecting with the university community (students, parents, public and private authorities)?	Research Engagement	1,093	0,067	16,357	***
P4 What level of satisfaction would you give the library as a center for user-generated projects (theses, scientific articles, essays, reports, assignments, among others)?	Research Engagement	1,045	0,058	18,115	***
P5 How relevant do you find the academic activities conducted by university authorities in the library? (project socialization, community engagement, meetings)	Research Engagement	1,073	0,066	16,266	***
P6 What experience do you believe external users (researchers, students, guests, etc.) take away from the library?	Research Engagement	1,001	0,063	15,780	***
P7 What satisfaction rating would you give the library as a place for individual and group learning and study?	Research Engagement	1,118	0,065	17,093	***
P8 What satisfaction rating would you give the library as a place for group learning and study?	Research Engagement	1,025	0,065	15,736	***
P9 How would you rate the kindness, availability, empathy, and knowledge of the library staff?	Specialized_Staff	1			
P10 How satisfied are you with the user service provided by the library staff?	Specialized_Staff	0,980	0,057	17,115	***
P11 How would you rate the support of the library staff in terms of issuing, returning, and renewing bibliographic material?	Specialized_Staff	0,888	0,057	15,717	***
P12 How satisfied are you with the assistance/support from the library staff when they have helped you search for bibliographic material?	Specialized_Staff	0,919	0,049	18,744	***

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Cont... Table 3

P13 What level of satisfaction would you give to the library staff when they have been able to answer your questions and solve problems effectively?	Specialized_Staff	0,928	0,052	17,937	***
P14 Are you satisfied with the guidance and recommendations (books, room usage) provided by the library staff?	Specialized_Staff	0,895	0,052	17,175	***
P15 In the circulation service, how would you rate the process of borrowing, renewing, and returning books?	Bibliographic Resources	1			
P16 What score would you give to the variety of physical books available in the library?	Bibliographic Resources	1,143	0,12	9,546	***
P17 What score would you give to the variety of digital books available in virtual libraries?	Bibliographic Resources	1,159	0,115	10,06	***
P18 What is your perception of the library staff's performance regarding the maintenance and preservation of bibliographic resources?	Bibliographic Resources	1,079	0,097	11,112	***
P19 How satisfied are you with the library's query module in terms of ease of use and resource availability?	Bibliographic Resources	1,168	0,101	11,529	***
P20 How satisfied are you with the ease of finding on the shelf the book you located in the query module?	Bibliographic Resources	1,132	0,103	11,017	***
P21 How satisfied are you with the accessibility of bibliographic resources in the library, both physical (books on shelves) and virtual (virtual libraries)?	Bibliographic Resources	1,216	0,106	11,461	***
P22 How would you rate the access and navigation in virtual libraries?	Physical Digital Holdings	1			
P23 How satisfied are you with the availability of virtual libraries (books, academic journals, scientific articles, others)?	Physical Digital Holdings	1,185	0,086	13,859	***
P24 What rating would you give to the multidisciplinary and specialized virtual libraries of the library?	Physical Digital Holdings	1,164	0,079	14,772	***
P25 How satisfied are you with the quality of the digital resources available (document resolution, quality of publications, etc.)?	Physical Digital Holdings	1,092	0,078	13,934	***
P26 How satisfied are you with the organization of books on the shelf?	Physical Digital Holdings	0,997	0,088	11,303	***
P27 What level of satisfaction would you give to the library's opening hours (Monday to Friday 08:00 to 20:00 and Saturday 08:00 to 12:00) for your academic activities?	Uso_Calidad_ Servicio	1			
P28 How satisfied are you with the frequency with which you use the library services?	Use Quality Service	1,164	0,101	11,508	***
P29 How do you rate the library environment in terms of tranquility, comfort, lighting, adequate climate conditions, among others?	Use Quality Service	1,180	0,101	11,717	***
P30 How satisfied are you with the cleanliness and hygiene of the reading room and the group and individual study rooms available in the library?	Use Quality Service	1,061	0,097	10,931	***
P31 How would you rate the individual study rooms in terms of meeting your needs for concentration and privacy?	Use Quality Service	1,185	0,11	10,794	***
P32 How satisfied are you with the Civil Infrastructure (Building) of the library?	Infrastructure	1			
P33 How satisfied are you with the reading room and group and individual study rooms that are available in the library?	Infrastructure	1,106	0,072	15,278	***
P34 How satisfied are you with the furniture and equipment of the reading, group, and individual study rooms available in the library?	Infrastructure	1,168	0,075	15,649	***

Cont... Table 3

P35 How would you rate the conditions of the furniture in the reading room and group and individual study rooms available in the library?	Infrastructure	1,100	0,074	14,922	***
P36 What rating would you give to the remodeling of bookshelves in the library?	Infrastructure	1,005	0,076	13,191	***
P37 What would be your satisfaction rating of the lighting system provided in the library rooms?	Infrastructure	0,852	0,076	11,251	***
P38 What is your rating of the electrical recharge system for laptops, cell phones, and other devices, located at various points on the reading room tables and study rooms?	Infrastructure	0,900	0,082	11,005	***
P39 How would you rate the arrangement of physical bookshelves in the library?	Infrastructure	0,974	0,072	13,519	***
P40 How would you rate the speed and reliability of the internet connection in the library?	Computer System	1			
P41 How satisfied are you with searching for books or other resources in the "KOHA" library management system?	Computer System	0,893	0,075	11,852	***
P42 How satisfied are you with the availability of computers in the library?	Computer System	0,912	0,082	11,092	***
P43 How satisfied are you with the communication received in your institutional email when you make loans, returns, and book expiration reminders by the library through	Computer System	0,915	0,088	10,389	***
P44 How satisfied are you with the ease of renewing your loans online (KOHA system)?	Computer System	0,971	0,083	11,721	***
P45 How satisfied are you with the accessibility and utility of the repository of undergraduate and graduate theses and dissertations in the library?	Computer System	0,953	0,074	12,818	***
P46 How satisfied are you with the process of registering space in the library through the computer system?	Computer System	0,950	0,075	12,589	***

Source: Own elaboration, 2024.

In the dimension of specialized staff, the factor loadings, ranging from 0.888 to 0.980, emphasize the need for trained personnel to ensure service quality, supporting Aslam's (2022) conclusions on the importance of continuous training in adopting advanced technologies. For bibliographic resources, the loadings, from 1.079 to 1.216, demonstrate the need for constant updating to meet user demands, as indicated by Verdegem & Verleye (2009).

Finally, physical and digital holdings and the use and quality of service, with loadings from 0.997 to 1.185, highlight efficient management and continuous evaluation as keys to ensuring equitable access to information and adaptation to user needs (Seal, 2015; Asim, Arif & Rafiq,

2022). Moreover, high factor loadings in infrastructure and computer systems reinforce the importance of adequate infrastructure and robust technological systems for optimizing management and maximizing user satisfaction (Alsabawy, Cater-Steel & Soar, 2013; Khan et al., 2023). Table 4 presents the correlations among the different satisfaction elements of university library users. The correlations reveal a high interdependence, crucial in the perception of service quality. The relationship between Research and Engagement and Specialized Staff (0.701) highlights the influence of trained personnel in supporting research activities, aligning with Cobblah & Van der Walt (2017), who emphasize their impact on academic and research success.

Table 4
Correlation of university library satisfaction elements

Elements	Connector	Elements	Estimate
Research_Engagement	<-->	Specialized_Staff	0,701
Research_Engagement	<-->	Bibliographic_Resources	0,743
Specialized_Staff	<-->	Bibliographic_Resources	0,814
Research_Engagement	<-->	Physical_Digital_Holdings	0,703
Specialized_Staff	<-->	Physical_Digital_Holdings	0,706
Bibliographic_Resources	<-->	Physical_Digital_Holdings	0,824
Research_Engagement	<-->	Use_Quality_Service	0,774
Specialized_Staff	<-->	Use_Quality_Service	0,752
Bibliographic_Resources	<-->	Use_Quality_Service	0,824
Physical_Digital_Holdings	<-->	Use_Quality_Service	0,817
Research_Engagement	<-->	Infrastructure	0,690
Specialized_Staff	<-->	Infrastructure	0,658
Bibliographic_Resources	<-->	Infrastructure	0,743
Physical_Digital_Holdings	<-->	Infrastructure	0,825
Use_Quality_Service	<-->	Infrastructure	0,879
Research_Engagement	<-->	Computer_System	0,712
Specialized_Staff	<-->	Computer_System	0,713
Bibliographic_Resources	<-->	Computer_System	0,790
Physical_Digital_Holdings	<-->	Computer_System	0,820
Use_Quality_Service	<-->	Computer_System	0,828
Infrastructure	<-->	Computer_System	0,852

Source: Own elaboration, 2024.

The correlation between Bibliographic Resources and Use and Quality of Service (0.824) underscores the importance of continuously updating resources to meet academic needs, aligning with the findings of Mugo & Mathu (2021) on the availability of updated resources as a key factor in service quality. Additionally, the relationship between Physical and Digital Holdings and Computer System (0.820) demonstrates the importance of efficiently integrating these resources through robust systems to ensure equitable and effective access.

Finally, the highest correlation observed between Use and Quality of Service and Infrastructure (0.879), highlights the role of adequate infrastructure in providing an optimal learning environment, in accordance with Wang, Zhong & Li (2022), who emphasize the need to evaluate and adapt infrastructure to meet the changing demands of users. Moreover, the relationship between Infrastructure and Computer System (0.852) reinforces the importance of advanced technological systems, capable of enhancing library management and user satisfaction, as affirmed by Khan et al. (2022).

The results in Table 5 indicate that all satisfaction indicators exhibit factor loadings above 0.50, demonstrating a solid alignment with the evaluated elements and confirming the validity of the model proposed by the Council for Quality Assurance in Higher Education in Ecuador. Variables P46 and P24, with loadings of 0.841 and 0.902, highlight the significant influence of infrastructure and physical and digital holdings on user satisfaction, supporting studies that emphasize their importance in library management (Ndhlovu, 2018; Nhamo & Malan, 2021).

Table 5
Multiple correlation of library user satisfaction items

Observed Variables	Estimate	Observed Variables	Estimate
P46	0,841	P23	0,826
P45	0,867	P22	0,624
P44	0,745	P21	0,820
P43	0,603	P20	0,759
P42	0,677	P19	0,830
P41	0,759	P18	0,772
P40	0,555	P17	0,634
P39	0,707	P16	0,572
P38	0,539	P15	0,507
P37	0,556	P14	0,819
P36	0,686	P13	0,850
P35	0,794	P12	0,882
P34	0,838	P11	0,754
P33	0,816	P10	0,816
P32	0,692	P9	0,763
P31	0,706	P8	0,735
P30	0,724	P7	0,792
P29	0,826	P6	0,737
P28	0,798	P5	0,758
P27	0,522	P4	0,832
P26	0,615	P3	0,762
P25	0,832	P2	0,839
P24	0,902	P1	0,783

Source: Own elaboration, 2024.

Indicators P45 and P13, with estimates of 0.867 and 0.850, underscore the relevance of the computer system and specialized staff in the perception of service quality. The literature highlights that the adoption of advanced technologies and continuous training are essential for maintaining high satisfaction levels (Hamad, Al-Fadel & Fakhouri, 2023). In the realm of bibliographic resources, P19 and P22, with loadings of 0.830 and 0.624 respectively, reinforce the need to ensure their availability and updating, aligning with findings by Adigun & Tella (2021).

Finally, the use and quality of service reflect high factor loadings in items P21 and P28, with values of 0.820 and 0.798, suggesting the importance of ongoing evaluation and improvement to meet the changing demands of users, as proposed by Wójcik (2019). Although P43 and P38 present lower estimates, at 0.603 and 0.539, they remain within an acceptable range, confirming the robustness of the model

and the contribution of each element to the overall user satisfaction.

Conclusions

This research aimed to assess the satisfaction levels of students and professionals at the Pontificia Universidad Católica del Ecuador using a multivariate model, following the regulations of the Council for Quality Assurance in Higher Education (CACES) for Ecuadorian universities. The generated model, based on the application of a specific instrument, demonstrated high reliability in the factors of research and engagement, specialized staff, bibliographic resources, physical and digital holdings, use and quality of service, infrastructure, and computer systems. These elements enhance the technical and administrative skills of library staff, benefiting students, faculty, and external researchers at the higher education institution.

The results obtained through structural equations indicate that the library services offered by the university are considered excellent by students and faculty. The attention provided by the librarians is reflected in an excellent categorical rating within the teaching-learning process, constituting a valuable input for university academic planning. However, a significant limitation of this study is that the test was applied only to users of the university community at PUCE Santo Domingo due to geographical restrictions.

For future research lines, it is suggested to link these satisfaction elements with academic success indicators. Furthermore, it is proposed to conduct comparisons among different university groups, such as academic programs, levels of study, public and private universities, gender, age, and religion, with respect to the criteria established by CACES for Ecuadorian universities. These comparisons will allow a deeper understanding of the variability in user satisfaction and the identification of specific areas for improvement in library management.

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