Staff Affection, the Key Factor in the Loyalty of University Students using Virtual Library Services that are Accessible by a Physical Access Space, in Developing Countries

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Abstract **– Virtual libraries are essential in strengthening research and education, especially in universities in the Dominican Republic. Despite facing various challenges, they offer services in physical spaces. This study examines the relevance of system quality, service quality, information quality, and staff interaction on student satisfaction and loyalty toward these physical virtual libraries. A survey of 531 students was analyzed using SPSS and PLS-SEM. Findings show that staff interaction positively affects user loyalty, though not satisfaction. Additionally, system quality, information quality, and service quality continue to positively influence user satisfaction, which, in turn, affects user loyalty. This research deepens our understanding of staff's influence on user loyalty in developing countries' virtual libraries.**

Keywords **– Educational services, affection, students, university, virtual library.**

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1. Introduction

University libraries are essential in the information society because they provide quality information to the academic community [1]. With the advent of information technologies, virtual university libraries have become a fundamental piece to meet the information needs of students [1]. These libraries are defined as online platforms that provide access to digital resources, such as databases, magazines, e-books, and multimedia materials [2]. Although virtual libraries have advantages for users, it has been discovered that students tend to avoid using them as their information resources due to a lack of understanding on how to utilize them [3]. Therefore, these virtual spaces should be analysed from the student's point of view, in order to know the satisfaction and loyalty that students have towards the virtual library [4].

Satisfaction encompasses a person's assessment and emotional reaction towards the overall journey of engaging with a service or product [5]. In the context of virtual libraries, satisfaction can be perceived as the collective sentiment formed through the interactions between users and digital libraries [6]. In this way, Zhou [7] indicated that user satisfaction could be related to the existence of gaps between the quality of the system, the quality of the information, and the quality of the service of the digital library perceived by users.

In this regard, the quality of the system is a multidimensional concept to be taken into account for measuring user satisfaction, and encompassing various indicative factors like stability, navigation, design, aesthetics, technical adequacy, security, and privacy [7]. Information quality is regarded as the degree to which users perceive the information to be pertinent, current, precise, and comprehensive [8].

In the case of quality of service, this is defined as the level of service that digital libraries provide to users in terms of reliability, responsiveness, empathy, and security [9], i.e., they are the characteristics that reduce the effort of users to find information [10]. In this study, the term 'system quality' is defined as the dependability of browsing, the effectiveness of websites, and the design of digital library websites. 'Information quality' denotes the timeliness, precision, and comprehensiveness of the information resources in digital libraries. Meanwhile, 'service quality' is characterized by the dependability, promptness, expertise, and customization of the services provided by digital libraries.

In the case of library user loyalty, this is exemplified by the willingness of users to invest time, effort, or even finances to utilize the services offered by the library [11]. From this perspective, the loyalty of library users can be seen as a reaction to user actions, such as returning to the library or endorsing it to others [12]. Consequently, it is crucial for libraries to endeavour to preserve the loyalty of their patrons [13].

In developing countries, virtual libraries have some limitations for students, such as access to computers, the Internet, and other information and communication technologies [14], [15]. These limitations have posed many challenges for universities [14]. However, universities in developing countries have developed actions to reduce this digital gap, with the creation of physical spaces with computers and Internet access for students to use virtual libraries [14], [15], thus facilitating access to digital resources remotely, which favours both the efficiency of research and learning [16]. Therefore, physical spaces prepared to offer access to virtual libraries have emerged as innovative solutions in developing countries, ensuring both access to information and educational resources for university students [2].

In this context, the student has access to a virtual service but is attended by staff who offer assistance in the physical space. In this way, the behaviours of these student assistants can influence students' perceptions of the virtual library. Thus, the concept of affection arises, which refers to the positive emotions that employees transmit through their behaviour, attitude, and communication towards users [17]. Therefore, affection is associated with a state of mind [18], and is a critical aspect of emotion [19] and can influence, by the way in which an employee behaves or communicates, a user's satisfaction [4], [12], [20].

The aim of this research is to analyse how system quality, information quality, service quality, and employee affection influence the satisfaction and loyalty of students using virtual library services in a physical space.

The study was conducted in the Dominican Republic, a developing country that still has many challenges in education and information technology [21], [22], [23]. The novelty of this study resides in its strategy, particularly focusing on the context of virtual libraries in developing nations and the inclusion of the role of staff affection to influence the satisfaction and loyalty of the user of virtual library services. The research gap addressed by this study is the limited understanding of the influence of staff affection on user satisfaction and loyalty in the context of virtual libraries. Therefore, analysis of the affective aspect of user-staff interactions fills a gap in the literature and provides valuable information for improving the virtual library experience for students in developing countries, where user-equipped spaces are vital to meet the accessibility challenges that exist in these regions.

2. Theoretical Background

This section describes the technology acceptance model and its adaptations, delving into how variables such as trust and service quality affect the adoption of technology, particularly in virtual libraries. Satisfaction and loyalty in the library environment are also examined, considering factors such as service, quality of information, and interactions between the user and library staff.

2.1. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a theory that has been widely used to explain the acceptance and use of technology. It has been suggested that TAM is a valid and solid model to explain technology adoption at the organizational level, but some studies have also proposed that TAM can benefit from additions and modifications to better adapt to specific contexts, such as that of virtual libraries [24]. These additions include variables such as trust, perceived financial cost, service quality, subjective norms, self-efficacy and facilitating conditions, among others, all of which are relevant to understanding users' motivations and the factors that influence their acceptance of technology [25].

Although this work is related to the TAM model, above all, when addressing the study of the satisfaction and loyalty of students who use virtual library services in a physical environment, in this study, we chose not to use the TAM as base due to the need to adapt the model to a specific context: that of virtual libraries in developing countries such as the Dominican Republic. In this sense, additional variables are introduced, such as service quality and the influence of staff affection, which are not explicitly included in the classic TAM model [24].

These additions and modifications seek to offer a more complete understanding of the motivations and factors that influence user satisfaction and loyalty in this particular context, which may not be fully covered by the TAM in its traditional form [24], [25].

2.2. Satisfaction and Loyalty in Libraries

The theory of information system success, initially proposed by DeLone and McLean [26] and subsequently improved by these same authors [27], suggests that service quality, information quality, and system quality are the three primary factors influencing the utilization and satisfaction derived from using an information system. This information system has subsequently been analysed in different aspects, including in virtual libraries [6]. The lack of relevant information resources has been considered one of the principal elements that deterred users from engaging with virtual services [28]. In this context, university students highlight quick access and accuracy of information as factors that precede satisfaction [29]. In this way, Thong *et al*. [30] pinpointed three key elements that enhanced contentment with the utilization of digital libraries, highlighting the characteristics of the interface, the accessibility of the virtual system, and the student's computer proficiency and experience. In his case, Nilsen [31] compared users' perspectives on face-to-face and virtual library services, highlighting the importance of user satisfaction in both contexts.

The study by Connaway *et al.* [32] highlighted that ignorance of services, lack of trust in the virtual format, and concerns about privacy affect when using virtual resources, such as libraries. Kim [33] found that the IT self-efficacy of female and male users was very uneven, this being relevant when analysing satisfaction by gender. Liu and Luo [34] found that students' expectations of information were a significant element in shaping the contentment of university students. For Chang [35], the quality of the information system and services were key factors influencing both the perceived value and the satisfaction of users with academic libraries. In their case, Zha *et al.* [36] recognized system quality, information quality, and service quality as precursors to satisfaction among virtual library users.

More recently, Zarei *et al.* [25] indicated that greater satisfaction with virtual library services was related to a greater assessment of the quality of the virtual system, the quality of the service provided, and the quality of the information. For their part, Alzahrani *et al.* [37] highlighted that the quality attributes of digital library systems significantly impact user satisfaction, behavioral intent, and variations in actual usage.

According to these authors, information quality is the strongest predictor for measuring university student satisfaction, and satisfaction has a strong effect on the behavioural intention of university students to use the virtual library system. Xie *et al.* [38] explored the similarities and disparities in the perceptions of teachers, librarians, and students regarding the use of virtual libraries in academic settings, indicating that there are differences between the three groups, including their degree of satisfaction. Studies published in recent years have established that service quality positively influences user satisfaction [39], including library users [40]. According to Chan *et al*. [41], perceived service quality could be achieved through user satisfaction. Considering the aforementioned context, the subsequent hypothesis is proposed:

- H1: The quality of the system influences satisfaction
- H2: The quality of information influences satisfaction
- H3: The quality of services influences satisfaction

The ability and responsiveness of an employee has an impact on user satisfaction [42]. Therefore, the competencies and behaviour of library staff are relevant to user satisfaction [42], [43], so when employees show appreciation, care and kindness towards users, it can improve the service experience and increase user satisfaction [4], [44]. The work environment, including factors such as situational leadership and motivation, can also influence employee job satisfaction, which in turn affects library user satisfaction, because if employees are happy in their work environment, they are more likely to be committed and motivated in their roles, offering better customer service and a more positive interaction with library users [44]. Likewise, effective interpersonal communication between librarians and library users is also associated with higher levels of user satisfaction [45]. Therefore, employees who convey affection through friendly and empathetic communication can help users feel more comfortable and confident when using virtual library services [4], which can have an impact on reducing the feeling of stress or frustration that some users may experience when navigating digital environments [42]. Also, when employees show affection and welcome users in a warm and positive way, users may feel valued and appreciated [46], which is important for increasing users' sense of belonging and connection to the virtual library [47]. Considering the aforementioned context, the subsequent hypothesis is proposed:

- H4: Employee affection influences satisfaction

Communication between librarians and users can also influence user loyalty to the library [12], [48].

Within this framework, aspects like compensation, empowerment, leadership approach, and communication can influence employee loyalty, which in turn can affect library user loyalty, because if employees are committed to providing high-quality service, patrons are more likely to have positive library experiences and return to the library regularly and as recommended to others [12], [48], [49]. Therefore, if employees show affection and empathy towards users, they may feel more confident and secure when using virtual library services and be inclined to continue using the virtual library [50]. Likewise, the affection of library staff towards users can contribute to creating an emotional bond between them, enhancing the probability that users will return to utilize library services in the future [46], [51] or recommend it to others [52]. Considering the context, the subsequent hypothesis is proposed:

- H5: Employee affection influences loyalty. In this hypothesis, loyalty is perceived as part of employees' affection.

The relationship between satisfaction and loyalty has been analysed in different contexts. Customer satisfaction, as modeled by Zeithaml *et al.* [53], is a driver of customer loyalty. That is, user satisfaction with the service positively influences user loyalty [54], [55]. Thus, if consumers believe that the performance of a service meets their expectations, they are likely to be satisfied [56], which promotes positive word-of-mouth about the service and reinforces the intention to use it again [57]. However, if consumers are dissatisfied, they are not likely to use the service or recommend it again [57]. In the environment of virtual libraries, Tan *et al.* [40] indicated that satisfaction could positively predict user loyalty. Therefore, in the library context, if users are content with the services offered by the library, they tend to remain loyal to it [48], either by using it again or by recommending its use to others [58]. Considering the context, the subsequent hypothesis is proposed:

- H6: Satisfaction influences loyalty

Figure 1 illustrates the structural model of the research.

3. Methods

This section details the study area and the quantitative methodology developed. Additionally, the PLS-SEM tool is described, which has been used for data analysis and validation of the research hypotheses.

3.1. Study Area

The study was centred on the Dominican Republic, particularly at the Universidad Tecnológica de Santiago (UTESA). This institution has a virtual library and physical library services in all the campuses where it is located and, in all these campuses (six in the country), it has implemented physical spaces with computers and the Internet for students to use the virtual library.

The virtual library used by the university is E-Libro. This platform is an aggregator of digital texts in Spanish, English, and Portuguese, where users have access to more than 200,000 publications, including books, journals, research works, and doctoral theses from more than 600 commercial and university publishers. This virtual library incorporates more than 1,000 new titles every month and offers services to more than 3 million users from educational institutions around the world, including from Spain, the United States, and China.

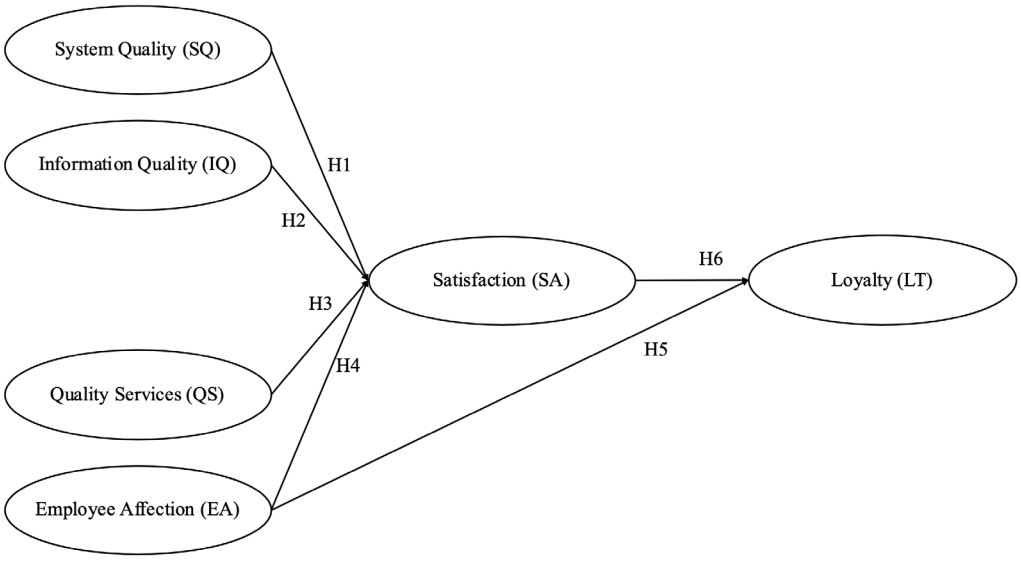

Figure 1. Proposed structural model

3.2. Questionnaire Design and Sample

The theoretical constructs of this research were evaluated through a five-point Likert-type scale, with the pertinent scales modified in accordance with a review of pertinent literature [13], [59]. A five-phase process was undertaken to translate the original scales into Spanish. A preliminary test involving 19 students was conducted to validate the clarity and structure of the questionnaire, which revealed no issues. The questionnaire was crafted using straightforward and clear language, steering clear of complex syntax to minimize potential biases [60]. The anonymity of the respondents was assured, they were informed that the responses had no right or wrong answers, and the length of the questionnaire was kept to a minimum to promote precise answers [60].

3.3. Data and Participant Profile

The data was collected through a structured, self-administered questionnaire in Spanish, which was physically handed out to students at the Universidad Tecnológica de Santiago. Students were approached for the questionnaire at the exits of the computer and internet spaces where the virtual library services were offered. The total number of students enrolled was 40,025. 531 questionnaires were applied from February to June 2023, giving a sampling error of ±4.22%. The characteristics of the sample that has a higher percentage make references to female students (59.2%), aged 19-21 (61.1%), not working (55.9%), earning less than US$300 per month (45.6%), and studying accounting (38.4%). The complete data of the sociodemographic profile of the sample are presented in Table 1.

3.4. Initial Analysis of Data

Table 2 shows the mean, standard deviation, Kolgomorov-Smirnov normality test and Cronbach's alpha, a test used to check the reliability of the scale. In this regard, Cronbach's alpha values greater than 0.7 indicate acceptable reliability [61]. The reliability of the overall scale was excellent, with a Cronbach's alpha value of 0.952. At the construct level, all of them have a Cronbach's score above 0.85, which is well above the minimum accepted value. However, sample normality could not be ascertained, so non-parametric tests will be applied.

The tabulation of the data and preliminary analysis of the results were carried out using the SPSS statistical program.

Subsequently, The Partial Least Squares Structural Equation Modeling (PLS-SEM), a composite-based approach emphasizing the prediction of hypothetical relationships to maximize the variance explained in the dependent variables, was employed in [62]. PLS-SEM is deemed particularly suitable for research aimed at prediction and explaining the variance of essential constructs due to its minimal bias [63]. The use of PLS-SEM ensures enhanced predictive power with R^2 values and presents more precise effect sizes [65]. Initially, the measurement model was executed to assess the reliability and validity of the constructs. Subsequently, the structural model was employed to test the hypotheses [66]. The SmartPLS software (v.3.2.8) facilitated this process [67].

4. Results and Discussion

Given the exploratory nature of the study, the analysis will primarily concentrate on the predictive strength and effect size of the model, as well as on the statistical inference of the structural relationships [68]. Thus, the analysis of the results will be divided into two clearly differentiated blocks: firstly, an examination of the reliability and validity of the measurement model at both the individual item and construct levels; secondly, an analysis of the structural model, where the aforesaid examination will be conducted due to its explanatory nature.

4.1. Reliability and Validity Analysis of the Measurement Model

On the individual item level, factor loadings have been analysed for each indicator, which should be equal to or greater than 0.70 [69]. Furthermore, at the construct or internal consistency level, the Dijkstra-Henseler (Rho_A) and Dillon-Goldstein (Rho_C) composite reliability tests were applied, where values must be equal to or greater than 0.70 [70]. Continuing with the analysis of internal consistency, convergent validity has been measured through the mean extracted variance, which must be equal to or greater than 0.5 [71], while discriminant validity, a test that shows that no construct is measuring what another construct measured by the model measures, has been tested through the Heterotrait-Monotrait Ratio. Cross-loadings were not used, because authors such as Henseler *et al.* [70] point out that the test that best demonstrates the lack of discriminant validity is the Heterotrait-Monotrait Ratio. In this respect, values above 0.90 indicate a lack of discriminant validity [72].

Table 1. Socio-demographic profile of the sample

Variable	%	Variable	%
Gender		Are you currently employed?	
Male	40.8	Yes	44.1
Female	59.2	No	55.9
Age		If you work, approximate salary per month	
18 or younger	9.6		
19-21	61.1	Less than US$300	45.6
22-24	17.9	US$301 to US$500	30.4
25-27	8.1	US$501 to US$700	13.2
28+	3.3	More than US$700	10.8
Degree you study			
Medicine	38.4		
Public Accounting	7.4		
Modern languages	6.9		
Systems Engineering	5.8		
Business Administration	5.0		
Civil Engineering	4.8		
Marketing	4.2		
Other degrees	27.8		

Table 2. Preliminary analysis of the data and reliability of the scale

		Mean	Standard deviation	K-S Test	Cronbach
Employee Affection (EA) - Items adapted from [59]					**0.875**
EA1	Library staff convey confidence to students	4.33	0.978	0.000C	
EA2	The library makes resources accessible from outside (home, office, or other location)	3.49	1.249	0.000C	
EA3	Library staff are polite and friendly	4.46	0.929	0.000C	
EA4	Employees satisfactorily answer students' questions	4.46	26.5	0.000C	
EA5	Employees have knowledge to answer students' questions	4.33	0.863	0.000C	
EA6	Employees treat students appropriately	4.45	0.859	0.000C	
EA7	Employees understand students' needs	4.24	0.917	0.000C	
EA8	Employees show their support for students	4.25	0.951	0.000C	
System Quality (SQ) - Items adapted from [13]					**0.887**
SQ1	Our university's digital library is reliable	3.81	1.050	0.000C	
SQ2	Browsing the digital library is effective	3.60	1.085	0.000C	
SQ3	The design of the digital library is clear	3.64	1.101	0.000C	
Information Quality (IQ) - Items adapted from [13]					**0.910**
IQ1	The information provided by this digital library is up to date	3.63	1.098	0.000C	
IQ2	The information provided by this digital library is accurate	3.66	1.060	0.000C	
IQ3	The information provided by this digital library is complete	3.65	1.065	0.000C	
Quality Services (QS) - Items adapted from [13]					**0.921**
SC1	Our university's digital library provides timely services	3.65	1.058	0.000C	
QS2	Our university's digital library provides quick answers to my questions	3.59	1.092	0.000C	
QS3	Our university's digital library provides personalised services	3.55	1.049	0.000C	
QS4	Our university's digital library provides professional services	3.74	1.047	0.000C	
Satisfaction (SA) - Items adapted from [13]					**0.938**
SA1	I am satisfied with the services provided by this digital library	3.53	1.121	0.000C	
SA2	I like the services offered by this digital library	3.54	1.109	0.000C	
SA3	Overall, I am satisfied with the digital library	3.57	1.090	0.000C	
Loyalty (LT) - Items adapted from [13]					**0.875**
LT1	I intend to use this digital library in the future	3.71	1.078	0.000C	
LT2	I will invite my classmates to use this digital library	3.53	1.129	0.000C	
LT3	I will continue to use this digital library in place of any alternative tools in the future	3.47	1.180	0.000C	

C: Lilliefors significance correction.

The outcomes of the reliability and validity analysis of the measurement model are detailed in Table 3. This table demonstrates outstanding reliability and validity of the measurement model, evident at both the individual item level (with all loadings surpassing the minimum threshold) and at the construct level.

4.2. Analysis of the Structural Model

Table 4 shows the results of the predictive power analysis, measured through the coefficient of determination or R^2, and the effect size of the model. In this regard, the moderate predictive power of the two endogenous variables that make up the model (Satisfaction and Loyalty) should be highlighted [73]. Disaggregating the predictive power yielded by the coefficient of determination, it is worth noting that the variables quality services and system quality are responsible for 30.50% and 19.60% respectively of the variability of the endogenous variable satisfaction. Special mention should also be made of the power of the satisfaction variable, as it manages to explain 66.73% of the variance of the endogenous variable loyalty. These results are in line with the results obtained at the effect size level [74], which confirm a large and significant effect of satisfaction on loyalty and a moderate and significant effect of quality services on satisfaction. The rest of the effects are not significant.

Finally, in order to test the significance or non-significance of the structural relationships of the model, a hypothesis test has been carried out using a Bootstrap of 10000 subsamples [75]. In this sense, and due to the non-normality of the variables that make up the model (Table 1), we proceeded by means of non-parametric tests, specifically, confidence intervals. Table 5 presents the hypothesis testing, showing the influence of system quality (H1), information quality (H2), and quality services (H3) on satisfaction, and of satisfaction (H6) and employee affection (H5) on loyalty. However, there was no evidence of the influence of employee affection (H4) on satisfaction.

The final structural model is presented in Figure 2.

5. Discussion

The results of this research have confirmed that system quality (H1), information quality (H2) and quality services (H3) have a significant influence on the satisfaction of virtual library users. This confirms the theory of information system success proposed by DeLone and McLean [26], [27], where it is emphasized that system quality, information quality, and service quality are the three primary determinants impacting the satisfaction derived from using an information system. Furthermore, the hypotheses of our research are in line with other studies [25], [35], [36], [37], [40].

In relation to employee affection (H4), the results of this research indicated that it does not have a significant influence on user satisfaction, which is different from previous studies [4], [42], [43], [44], [45]. These findings could be due to the fact that, while friendly and empathetic treatment by staff is important [46], it is not a major factor in determining users' satisfaction with the virtual library service.

However, the research results suggested that employee affection (H5) does influence user loyalty towards the virtual library, supporting the results of previous studies [12], [48], [49]. Therefore, aspects such as warm, friendly, and empathetic treatment by staff can generate an emotional bond with users, which increases the likelihood that they will continue to use the virtual library in the physical space [46], [51] and that they will also recommend other colleagues to go to the physical space and use the virtual library [52].

Furthermore, this research has shown that user satisfaction (H6) has a positive impact on online library loyalty, corresponding with previous studies [40]. Satisfied students are therefore more likely to continue using the virtual library in the future and to recommend it to others, supporting the idea that satisfaction is a key driver of loyalty [28], [54].

Table 3. Assessment of the measurement model's reliability and validity at both the individual item and construct levels

		Heterotrait-Monotrait Ratio						
	Loads		**EA**	**IQ**	**SQ**	**LT**	**SA**	**QS**
Employee affection (Rho_A: 0.893; Rho_C: 0.914; AVE: 0.577)		**EA**						
EA1	0.800	**IQ**	0.411					
EA2	0.712	**SQ**	0.441	0.814				
EA3	0.803	**LT**	0.343	0.784	0.797			
EA4	0.783	**SA**	0.311	0.795	0.794	0.831		
EA5	0.769	**QS**	0.436	0.876	0.898	0.790	0.815	
EA6	0.806							
EA7	0.822							
EA8	0.792							
Quality of the information (Rho_A: 0.911; Rho_C: 0.943; AVE: 0.847)								
IQ1	0.919							
IQ2	0.936							
IQ3	0.906							
Quality of the system (Rho_A: 0.890; Rho_C: 0.930; AVE: 0.816)								
SQ1	0.891							
SQ2	0.912							
SQ3	0.907							
Loyalty (Rho_A: 0.876; Rho_C: 0.923; AVE: 0.801)								
LT1	0.873							
LT2	0.920							
LT3	0.891							
Satisfaction (Rho_A: 0,938; Rho_C: 0,960; AVE: 0,890)								
SA1	0.945							
SA2	0.949							
SA3	0.936							
Quality Services (Rho_A: 0,921; Rho_C: 0,944; AVE: 0,808)								
QS1	0.903							
QS2	0.918							
QS3	0.894							
QS4	0.881							

Notes: EA: Employee affection; IQ: Information quality; SQ: System quality; LT: Loyalty; SA: Satisfaction; QS: Quality services.

Table 4. Predictive power and effect size

	R^2	β	Corr.	Var. Exp.	f2(Sig.)
Satisfaction	0.617				
H1: Quality of the system		0.270	0.726	**19.60%**	0.052(0.053)
H2: Quality information		0.176	0.735	**12.93%**	0.016(0.256)
H3: Quality services		0.403	0.757	**30.50%**	0.090(0.005)
H4: Employee affection		-0.046	0.293	**-1.34%**	0.005(0.583)
Loyalty	0.691				
H5: Employee affection		0.076	0.312	**2.37%**	0.017(0.171)
H6: Satisfaction		0.806	0.828	**66.73%**	1.921(0.000)

Table 5. Hypothesis testing

	β	IC95%	
		2.5%	97.5%
H1: Quality of the system → Satisfaction	0.270^{SIG}	0.144	0.410
H2: Quality of the information → Satisfaction	0.176^{SIG}	0.034	0.312
H3: Quality services → Satisfaction	0.403^{SIG}	0.266	0.531
H4: Employee affection → Satisfaction	-0.046^{NS}	-0.117	0.030
H5: Employee affection → Loyalty	0.076^{SIG}	0.022	0.129
H6: Satisfaction → Loyalty	0.806^{SIG}	0.758	0.849

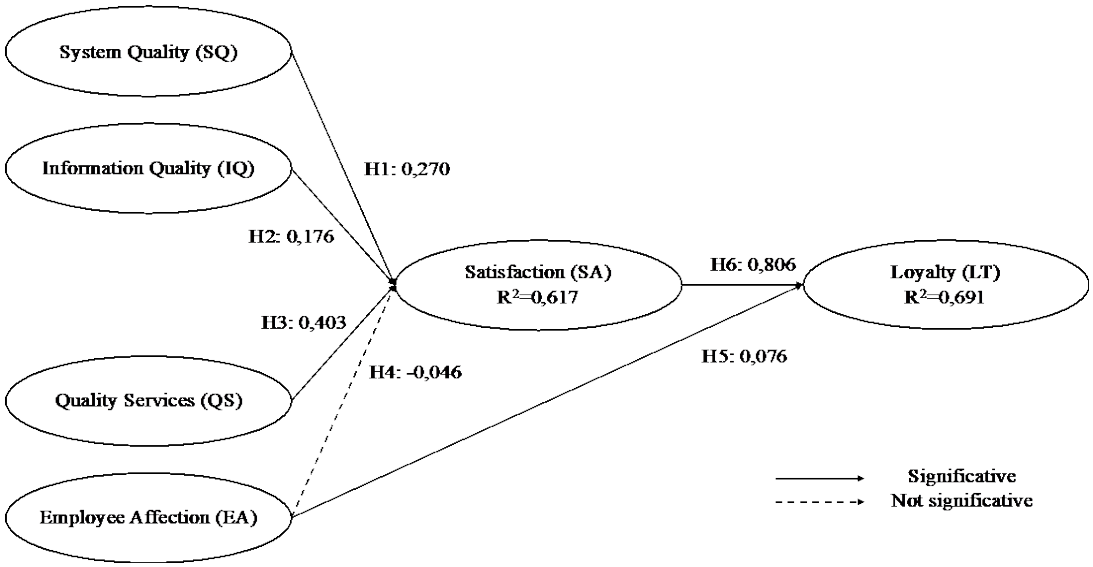

Figure 2. Final structural model

6. Conclusion

The findings of this research have provided an in-depth understanding of the factors that influence the satisfaction and loyalty of virtual library users in a specific context, such as the Dominican Republic, a developing country with challenges in education and information technology. The originality and innovation of this research was to include the affective aspect of library staff as an antecedent of the satisfaction and loyalty of virtual library users. This perspective has not been widely studied in the scientific literature, especially from a developing country context, such as the Dominican Republic, where such spaces equipped for the use of virtual libraries are vital to meet the challenges of accessibility and improve the educational experience of students in regions with limited technological resources. The findings of the study have indicated that the affection of the staff serving users influences users' loyalty to the virtual library, but not their satisfaction. In addition, other relationships already studied have been consolidated, including the impact of system quality, information quality, and service quality on the satisfaction of virtual library users, as well as the effect of user satisfaction on their loyalty to the virtual library.

Indeed, one of the principal theoretical implications of this study is the expansion of our understanding of the factors that impact the satisfaction and loyalty of virtual library users. The research affirms the significance of system quality, information quality, and service quality as crucial elements influencing user satisfaction. Moreover, it underscores the pivotal role of staff warmth as a substantial predictor of user loyalty, emphasizing that interpersonal interactions and friendliness are vital in cultivating user loyalty to the virtual library. From a practical approach, the results of this research have important implications for universities in the Dominican Republic and other developing countries. Universities can use these features to improve their virtual library services and provide a more satisfying experience for their users. However, it is essential to train library staff to show affection and empathy towards users, as this can generate a greater sense of belonging and emotional connection, which in turn fosters loyalty and promotes recommendation of the service to others.

This research also has several limitations that warrant consideration. Firstly, the study's focus on university students from a single university in the Dominican Republic restricts the generalizability of the findings to other populations and settings.

Therefore, it is advisable for future research to replicate similar studies among diverse user groups and in various developing countries to achieve a more comprehensive and representative understanding of the factors influencing satisfaction and loyalty in virtual libraries. Additionally, this research concentrated on specific facets of user satisfaction and loyalty; however, in future research it would be advisable to explore other factors that could be influencing satisfaction and loyalty, such as the quality of information resources, technological accessibility or the perceived usefulness of services, among others. Future research could also explore the relationship between staff affection and other aspects, such as job satisfaction and performance of library staff, or the perception of other stakeholders, such as teachers who also use the virtual library from physical spaces of the university.

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