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Student Satisfaction with Physical and Digital Library Facilities in Higher Education Institutes

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The landscape of higher education is undergoing continuous transformation, with library facilities playing a pivotal role in shaping student experiences and academic success. This study explores student satisfaction with both physical and digital library facilities within diverse higher education institutions, employing the Information Systems Success Model as a theoretical framework. While physical libraries offer curated collections and personalized services, digital libraries provide unparalleled convenience and accessibility. However, the satisfaction derived from each format differs, with physical libraries emphasizing service quality and collection relevance, and digital libraries prioritizing information quality aligned with the curriculum. Notably, the size of digital collections doesn't guarantee higher satisfaction, highlighting the importance of relevance. Perceived usefulness significantly influences satisfaction with digital libraries. To enhance user satisfaction, libraries should invest in user-friendly services, continuously curate collections, prioritize digital information quality, adapt to trends, and actively use feedback for improvement. This study underscores the imperative for libraries to evolve in tandem with changing student needs and preferences to optimize their role in supporting academic endeavours.

Keywords: Higher education, Physical library facilities, Digital library facilities, Student satisfaction

1. Introduction

In the continually evolving landscape of higher education, the pivotal role of library facilities is in shaping the overall student experience and fostering academic success[1-2]. Libraries serve as vital hubs for intellectual exploration, providing students with diverse resources crucial for research, learning, and scholarly engagement[3-4]. As institutions increasingly integrate technological advancements, the dichotomy between traditional physical library spaces and the burgeoning space of digital libraries has become a focal point of interest[5]. Thus, the significance of library facilities in higher education articulates the research problem and objective and elucidates the relevance of studying physical and digital library facilities to enhance student satisfaction.

The foundation of academic excellence rests upon the availability and accessibility of resources that facilitate comprehensive learning[6]. Libraries, as information repositories, grant students access to various scholarly materials, ranging from traditional printed resources such as textbooks and journals to contemporary digital databases[7]. The conventional physical library, distinguished by its carefully curated collection of print materials, study spaces, and the expertise of librarians, has consistently been recognized as an essential element within the academic ecosystem. However, the advent of the digital era marks a significant connection, leading to a new phase that revolutionizes library services by introducing digital resources, online databases, and virtual repositories[8]. This transformative shift underscores the imperative to critically examine the evolving role of libraries in higher education, ensuring their adaptation to the dynamic demands of contemporary students.

The research objective of this study is to identify the students' satisfaction with library facilities in higher education, with a specific focus on both physical and digital formats. While literature acknowledges the importance of libraries in supporting academic endeavours, a paucity of research systematically examines students' satisfaction levels concerning these two distinct formats[2]. Addressing this gap is essential for understanding how students interact with and perceive the offerings of physical and digital libraries, thereby informing strategic improvements to enhance the overall quality of library services.

The importance of analyzing physical and digital library facilities rests in acknowledging the changing nature of information consumption and students' learning preferences. Although physical libraries offer

a hands-on and engaging experience, digital libraries offer unparalleled convenience, accessibility, and flexibility[9]. The interdependent relationship between these two formats provides a complex and subtle landscape that requires thorough analysis. By understanding how students navigate and utilize both physical and digital libraries, institutions can implement informed strategies to create comprehensive library services that enhance overall student satisfaction and contribute to their academic success.

2. Literature Review

The pivotal role of physical library spaces in enhancing student satisfaction and academic achievement has been consistently underscored in the literature. Markey *et al.*[1] highlight the positive correlation between the presence of physical library spaces and improvements in student well-being and academic performance, while Brown and Johnson[10] emphasize their significance in cultivating collaborative learning environments. Turner and Clark[11], Garcia and Martinez[12], and Carter and Davis[13] offer additional perspectives on the critical role of physical libraries in facilitating academic success, exploring various aspects, including student perceptions, the impact of space redesign, and the evolving responsibilities of librarians.

Huang and Leea[14] delve into the positive associations between tangible resources within physical libraries and academic excellence, providing further evidence of the integral role played by these spaces in shaping a conducive academic environment. Additionally, Adams and Wilson[15] and Morris and Reed[16] contribute to a nuanced and comprehensive understanding of the affirmative influence exerted by physical library spaces on student engagement and overall success through their exploration of the holistic learning environment.

In contrast, the paradigm shift in digital libraries is substantiated by Mizrachi and Salaz[9], which explore the impact of digital resources on student satisfaction. Wilson and Anderson[17], Chen and Liu[18], and Gomes and Patel[19] provide comprehensive insights into various facets of digital libraries, encompassing evolution, student utilization, information literacy skills, and educational impacts. Baker and Turner[20] focus on the educational impacts, while Lee and Wang[21] examine information-seeking behaviour. Kumar and Gupta's[22] qualitative study captures student perspectives, and Smith and Brown's[23] analysis correlates digital libraries with student performance metrics. Together, these studies underscore the transformative nature of digital libraries, offering convenience, accessibility, and personalized learning experiences.

Nevertheless, although there is a substantial amount of literature on student satisfaction with library resources, there is still an apparent deficiency in comprehensive research that examines both the physical and digital aspects together in a single study. While certain academics primarily concentrate on conventional library environments, others explore digital resources, frequently neglecting the interconnectivity of different media. This gap highlights the necessity for thorough research that considers the simultaneous existence of physical and digital library services, acknowledging the changing tastes and behaviours of modern students who effortlessly traverse between these two aspects.

3. Theoretical Framework

The exploration of student satisfaction with both physical and digital library facilities in higher education is grounded in the Information Systems Success Model. This theoretical framework, synthesized from established models such as the Expectation-Confirmation Model (ECM) and the DeLone and McLean Information Systems Success Model, provides a holistic lens for study.

3.1 Variables for Measurement

Information Quality stands as a foundational variable, encompassing the accuracy, relevance, and reliability of information. Within physical libraries, this pertains to the precision of cataloguing and organizational methods, while in digital libraries, it extends to the credibility and reliability of online resources[24].

System Quality emerges as a vital aspect for both physical and digital libraries, centering on the efficiency, reliability, and responsiveness of the library system. In the physical space, this encompasses the functionality of catalogue systems and the ease of access. In the digital sphere, it entails the functionality of the online platform, responsiveness of search interfaces, and reliability of digital resources[24].

Service Quality captures the degree of assistance and support offered, embracing the helpfulness of librarians and the accessibility of assistance within physical libraries. In the context of digital libraries, it expands to include the responsiveness of online help services and user support[24].

Library Collection assesses the scope, depth, and pertinence of resources within both physical and digital library settings. It considers the diversity and comprehensiveness of the library's collection, recognizing its influence on user satisfaction[24].

Perceived Usefulness is a metric indicating the extent to which users perceive the library as supporting their academic pursuits, encompassing the evaluation of the value and utility attributed to the resources and services provided by the library[25].

Perceived Ease of Use assesses users' perceptions regarding the simplicity and accessibility of library facilities. In the physical space, it involves considerations of the layout and accessibility of resources, while in the digital realm, it encompasses the user-friendliness of online interfaces[25].

Aligned with the Information Systems Success Model, the research questions and hypotheses are structured to conform to its emphasis on user expectations, perceived performance, and overall satisfaction[24]. For instance, research inquiries may explore how information quality, system quality, and service quality contribute to user satisfaction in both physical and digital library settings.

This theoretical framework serves as a robust foundation for the study, facilitating a comprehensive assessment and comparison of student satisfaction in physical and digital library facilities.

4. Study Design and Methodology

A quantitative research approach was used to achieve the research objective of identifying student satisfaction with both physical and digital library facilities in higher education.

4.1 Sampling Strategy and Sample Size

The sampling approach comprised a blend of simple and stratified random sampling techniques. Simple random sampling was utilized to select higher education institutions with diverse library facilities, encompassing both traditional and technologically advanced setups. Stratified random sampling was applied to select those institutions' different academic disciplines and student demographics.

Based on the Sri Lankan scenario, five higher education institutes that practice physical and digital library facilities were selected. Based on the student population of those institutes, 456 sample students were selected. Table 1 displays the attributes of the respondents.

Table 1 — Characteristics of the Respondents

Variable	Categories	Frequency	Percentage
Type of Higher Education Institute	Government	362	79.4
	Semi-government	43	9.4
	Private	51	11.2
Academic Program	Three years	82	18
	Four years	343	75.2
	Other	31	6.8
Study Year	First year	12	2.6
	Second year	144	31.6
	Third year	225	49.3
	Other	75	16.4
Library Usage	Daily	17	3.7
	Weekly	220	48.2
	Monthly	219	48.0

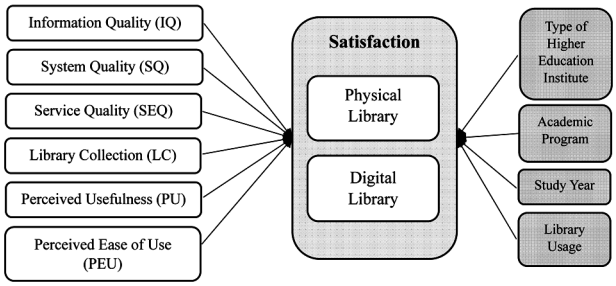

Fig. 1 — Conceptual Framework of the Study

4.2 Data Collection Process

The data collection process will consist of quantitative surveys. The survey will include questions related to information quality, system quality, service quality, library collection, perceived usefulness, and perceived ease of use.

The surveys will be designed based on validated scales derived from the Information Systems Success Model[24] and relevant literature on library satisfaction[1-2].

4.3 Data Analysis

The evaluation of student satisfaction levels with physical and digital library facilities was conducted using Structural Equation Modeling (SEM). Path analysis was utilized to identify the key variables influencing satisfaction and to determine whether control variables, including the type of higher education institute, academic program, study year, and library usage, impact student satisfaction. Figure 1 shows the conceptual frame of the study.

5. Data Analysis and Results

The study's data analysis consists of two sections. The first section pertains to the satisfaction of physical library services among students in higher

Table 2 — Convergent Validity & Reliability

Variables		Number of Attributes	Factor Loadings (Standardized)		AVE	CR
			Min	Max		
Physical Library	IQ	3/5	.708	.763	.535	.775
	SQ	3/3	.719	.857	.603	.819
	SEQ	4/5	.876	.949	.851	.958
	LC	3/4	.937	.963	.906	.966
	PU	5/5	.706	.831	.583	.874
	PEU	4/5	.706	.777	.549	.830
	S	3/4	.543	.966	.664	.849
Digital Library	IQ	3/5	.928	.948	.879	.956
	SQ	3/3	.718	.859	.602	.819
	SEQ	3/5	.723	.725	.528	.770
	LC	4/4	.692	.721	.501	.801
	PU	4/5	.817	.888	.737	.918
	PEU	4/5	.762	.852	.672	.891
	S	3/4	.757	.929	.569	.840

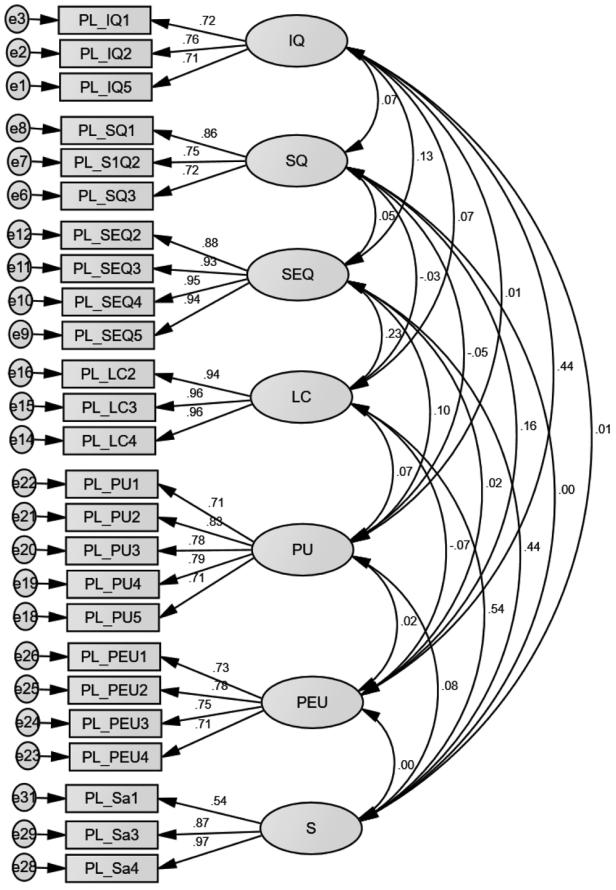

Fig. 2 — Structural Model of Physical Library

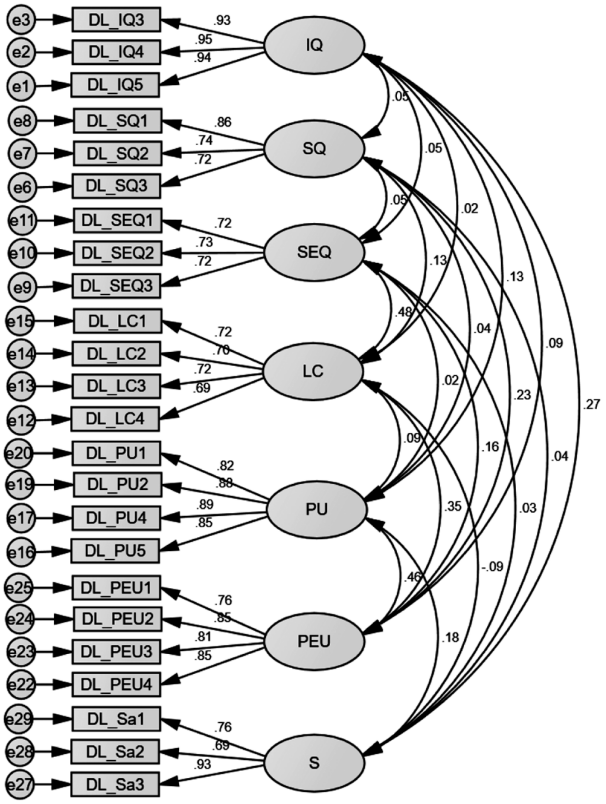

Fig. 3 — Structural Model of Digital Library

education institutes, while the second section presents satisfaction with digital library facilities.

5.1 Satisfaction with Physical and Digital Library Facilities

Based on the conceptual framework, Satisfaction (S) regarding the physical and digital library facilities is measured through the information quality (IQ), system quality (SQ), service quality (SEQ), library collection (LC), perceived usefulness (PU) and perceived ease of use (PEU).

As illustrated in Table 2 along with Figures 2 and 3, the assessments of convergent validity were substantiated, as each individual attribute surpassed the 0.50 threshold[26]. The evaluation of item reliability

utilized Composite Reliability (CR) and Average Variance Extracted (AVE). The reliability examination was further substantiated, revealing that the CR values for each item exceeded the 0.6 threshold, and all AVE values surpassed the 0.5 threshold[27]. This exhaustive examination underscores the reliability and steadfastness of the questionnaire items in gauging the specified constructs.

As presented in Table 3, CMIN/DF stands at 2.665 and 2.629, while the GFI attains a value of 0.906 and 0.898 for physical and digital libraries, respectively. The findings also indicate that the NFI and the CFI, signify an overall acceptable fit for the model. Additionally, the AGFI for both models (physical and digital library) exhibits 0.880 and 0.868, surpassing the recommended threshold of 0.80[28]. The RMR and RMSEA display values less than 0.05 and 0.07, respectively[29-33].

As indicated in Tables 4 and 5, the square root of AVE of all constructs is greater than the correlation with other constructs, indicating the establishment of discriminant validity for this study.

The outcomes derived from the path analysis were primarily acquired at two tiers: one without incorporating the controlled variables and the other with the inclusion of controlled variables for both physical and digital libraries. The controlled variables considered are study year, library usage, academic program, and type of higher education institute. Figure 4 illustrates the structural model without controlled variables and its standard estimates, and Figure 5 illustrates the structural model with controlled variables and its standard estimates for physical library facilities. Moreover, figure 6 illustrates the structural model without controlled variables and its standard estimates and Figure 7 illustrates the structural model with controlled variables and its standard estimates for digital library facilities.

Tables 6 and 8 summarize the path coefficient and the significance of the structural models in the physical and digital library facilities, excluding controlled variables. Tables 7 and 9 summarize the path coefficient and the significance of the structural models in the physical and digital library facilities, including controlled variables.

Table 6 indicates that service quality and library collection significantly impact students' satisfaction

Table 3 — Goodness of Fit of the Measurement Models (Physical and Digital Library)

The Goodness of Fit Index		Physical Library	Digital Library
Absolute fit indices	CMIN/DF	2.665	2.629
	GFI	.906	.898
	AGFI	.880	.868
	RMR	.030	.045
	RMSEA	.060	.060
Incremental fit indices	TLI	.935	.929
	CFI	.945	.940
	RFI	.900	.890
	NFI	.916	.908
Parsimony fit indices	PGFI	.708	.694
	PRATIO	.847	.841
	PNFI	.775	.763
	PCFI	.800	.791

Table 4 — Results of the Discriminant Validity Assessment of the Physical Library Model

	IQ	SQ	SEQ	LC	PU	PEU	S
IQ	**0.732**						
SQ	0.057	**0.776**					
SEQ	0.116	0.053	**0.923**				
LC	0.059	-0.029	0.219	**0.952**			
PU	0.006	-0.053	0.102	0.066	**0.764**		
PEU	0.354	0.125	0.018	-0.063	0.004	**0.741**	
S	-0.044	0.047	0.169	0.230	-0.039	-0.046	**0.815**

Table 5 — Results of the Discriminant Validity Assessment of the Digital Library Model

	IQ	SQ	SEQ	LC	PU	PEU	S
IQ	**0.937**						
SQ	0.056	**0.776**					
SEQ	0.046	0.054	**0.727**				
LC	0.020	0.123	0.376	**0.708**			
PU	0.123	0.028	0.013	0.076	**0.859**		
PEU	0.087	0.193	0.131	0.295	0.412	**0.820**	
S	0.421	-0.030	0.041	-0.023	0.184	0.029	**0.800**

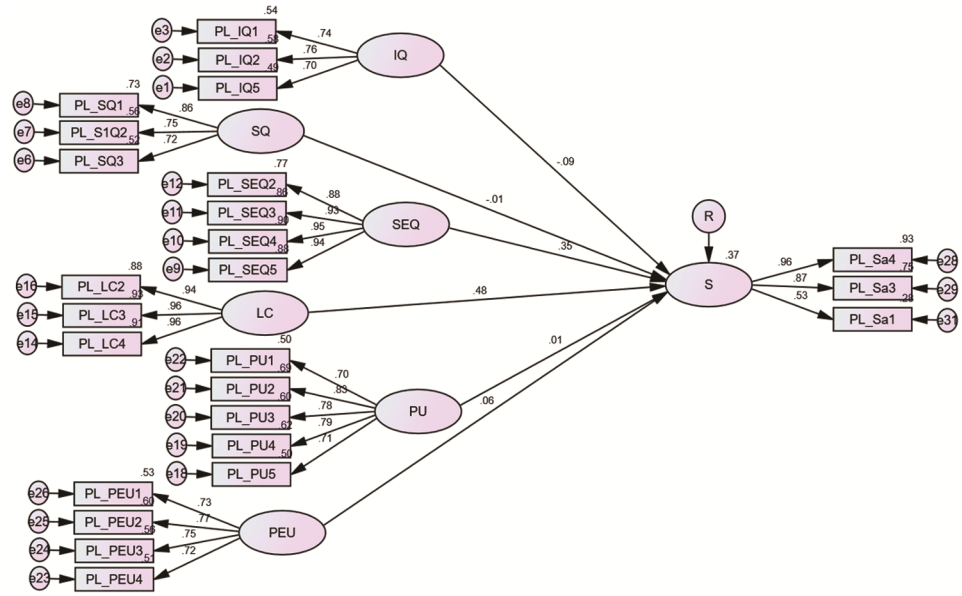

Fig. 4 — Structural Model without the Controlled Variables (Physical Library)

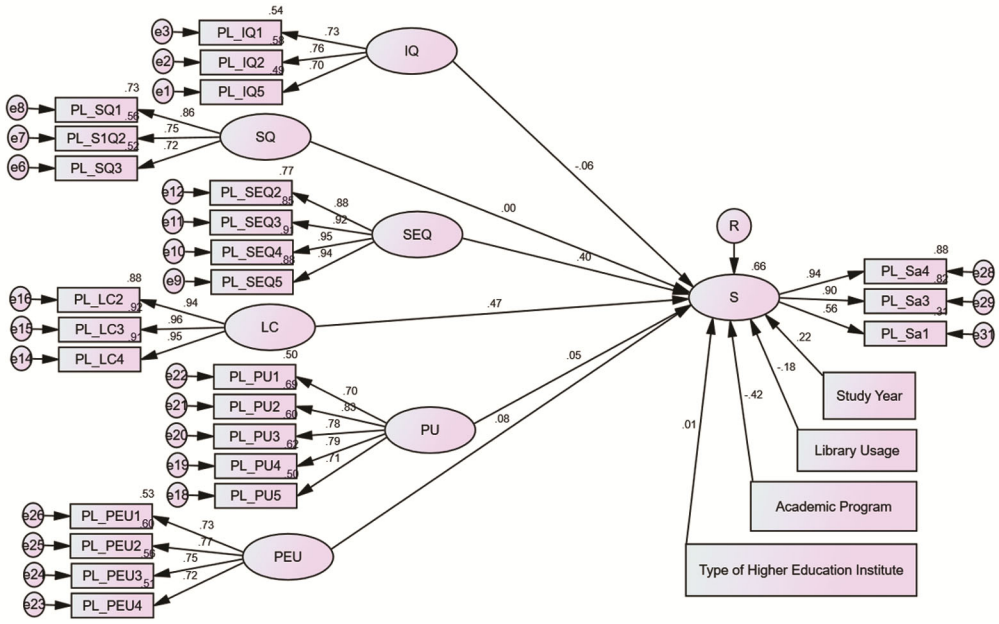

Fig. 5 — Structural Model with the Controlled Variables (Physical Library)

regarding the physical library. Both variables indicate positive associations with satisfaction regarding the physical library facilities. When examining the impact of controlled variables on the dependent variable, Table 7 indicates that study year, library usage and academic program significantly impact satisfaction with physical library facilities. Moreover, the study year indicates a positive relationship with satisfaction level, and the other two variables indicate a negative relationship with the level of satisfaction.

Concerning digital library facilities, Table 8 summarizes the regression weights in the structural model, excluding controlled variables. It indicates that information quality, library collection and perceived usefulness significantly impact students' satisfaction regarding digital library facilities. Information quality and perceived usefulness indicate positive associations, and library collection indicates a negative association with satisfaction regarding the physical library facilities.

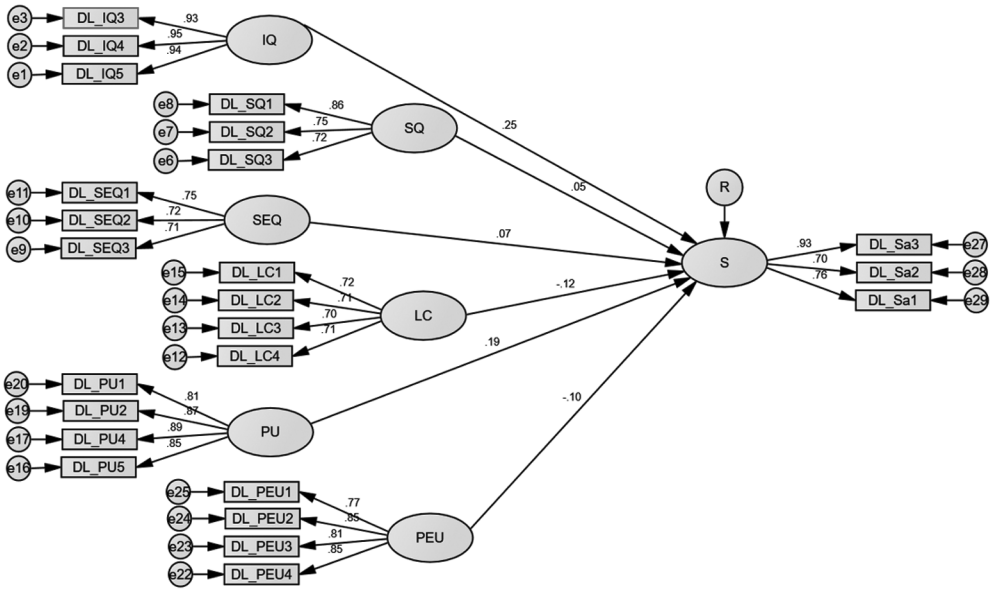

Fig. 6 — Structural Model without the Controlled Variables (Digital Library)

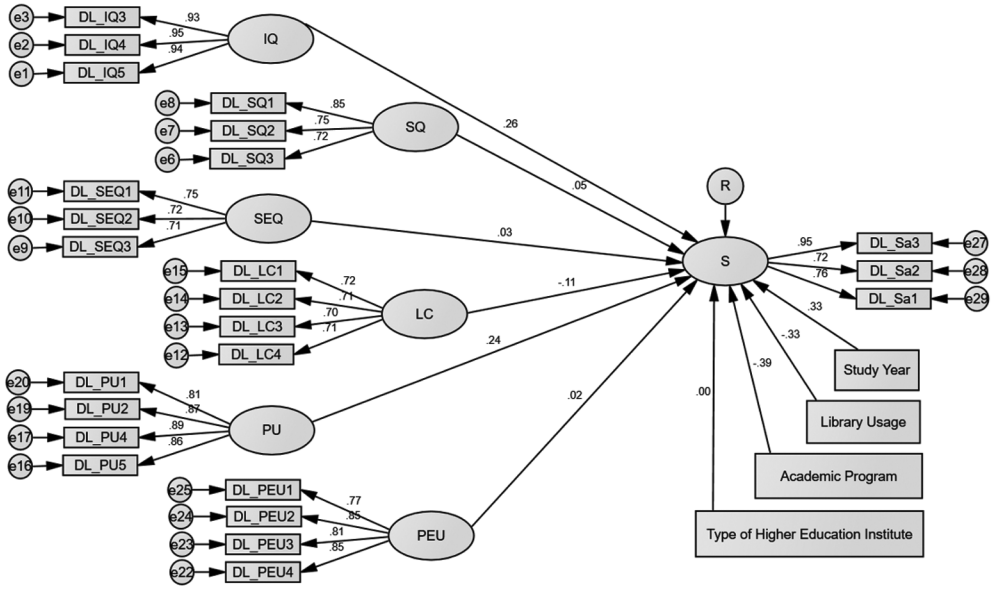

Fig. 7 — Structural Model with the Controlled Variables (Digital Library)

When assessing the impact of controlled variables on the dependent variable, Table 9 indicates that study year, library usage and academic program significantly impact satisfaction with digital library facilities. Moreover, the study year indicates a positive relationship with satisfaction level, and the other two variables indicate a negative relationship with the level of satisfaction.

6. Discussion

Students' satisfaction with the physical library is based on two main factors: service quality and library collection. Service quality encompasses the library's ability to respond promptly to student needs, cultivate a study environment that is both comfortable and conducive to learning, and maintain an approachable and helpful staff. It revolves around students' overall experience while engaging with the physical library.

On the other hand, the library collection positively impacts satisfaction with the physical library. This includes ensuring that the resources are aligned with the curriculum, covering relevant academic materials, and providing access to information in various

Table 6 — Path Coefficient of the Physical Library Structural Model excluding Controlled Variables.

	Path Coefficients	Sig-value
$H1_a$: Satisfaction → IQ	-.070 (.038)	.053
$H1_b$: Satisfaction → SQ	-.005 (.033)	.815
$H1_c$: Satisfaction → SEQ	.365 (.040)	.001
$H2_d$: Satisfaction → LC	.532 (.055)	.001
$H2_e$: Satisfaction → PU	.010 (.032)	.737
$H2_f$: Satisfaction → PEU	.046 (.038)	.216

Parenthetical values represent the standard errors of path coefficients.

Table 7 — Physical Library Structural Model Path Coefficient including Controlled Variables.

	Path Coefficients	Sig – value
Study Year	.190 (.033)	.001
Library Usage	-.205 (.041)	.001
Academic Program	-.556 (.058)	.001
Type of Higher Education Institute	.009 (.034)	.735

Parenthetical values represent the standard errors of path coefficients.

Table 8 — Path Coefficient of the Digital Library Structural Model excluding Controlled Variables.

	Path Coefficients	Sig-value
$H1_a$: Satisfaction → IQ	.246 (.042)	.001
$H1_b$: Satisfaction → SQ	.031 (.038)	.404
$H1_c$: Satisfaction → SEQ	.049 (.041)	.222
$H2_d$: Satisfaction → LC	-.078 (.037)	.026
$H2_e$: Satisfaction → PU	.113 (.030)	.001
$H2_f$: Satisfaction → PEU	-.057 (.036)	.104

Parenthetical values represent the standard errors of path coefficients.

Table 9 — Digital Library Structural Path Coefficient including Controlled Variables.

	Path Coefficients	P – value
Study Year	.282 (.036)	.001
Library Usage	-.366 (.049)	.001
Academic Program	-.496 (.050)	.001
Type of Higher Education Institute	-.001 (.038)	.996

Parenthetical values represent the standard errors of path coefficients.

formats, catering to students' diverse learning preferences.

The positive impact of service quality and library collection on satisfaction suggests that when students perceive the library as responsive to their needs, with a conducive study environment and a well-curated collection, their overall satisfaction is heightened. Moreover, satisfaction with the physical library is not significantly influenced by information quality, perceived usefulness, and perceived ease of use. This implies that, at least in the context of the physical library, students may prioritize the library's responsiveness and the quality of its collection over other considerations.

In digital library facilities, the key determinant of satisfaction lies in the quality of available information. Users express higher satisfaction when the digital resources are not only up-to-date, well-organized, and relevant but also when they seamlessly integrate with the academic curriculum. This integration ensures that the digital materials align with students' specific educational goals and requirements.

Furthermore, the research findings highlight that an increased size of the digital library collection does not necessarily correlate with heightened satisfaction. The inverse association between the volume of the collection and satisfaction implies that users may prioritize factors such as relevance and accessibility over sheer quantity. This emphasizes the imperative for libraries to concentrate on the meticulous curation of content tailored to the specific needs and preferences of their user base, rather than indiscriminately expanding the collection without thoughtful consideration.

Moreover, the perceived usefulness of digital resources emerges as a critical factor influencing satisfaction in the digital library landscape. Students attribute a significant portion of their academic success and enriched learning experiences to the efficacy of digital resources.

When evaluating the analysis of controlled variables and their influence on satisfaction in both physical and digital libraries, it becomes noticeable that these variables significantly impact the overall user experience. Variations emerge when considering the study year, library usage patterns, and academic program as influential factors. A positive association between the academic year and satisfaction indicates that students generally become more satisfied with library facilities as they move through their academic careers. This positive trend might be attributed to a growing familiarity with library resources, services, and spaces as students' progress through their academic years. Libraries should recognize this evolving relationship and consider tailoring their services to meet students' changing needs and expectations at different stages of their academic careers.

On the other hand, the negative association between library usage patterns and satisfaction suggests a more intricate relationship. While students who use the library daily, weekly, or monthly may

have higher expectations or specific needs, the negative impact implies that these expectations might not always be met. Understanding the reasons behind this inverse relationship is crucial for libraries to adapt and enhance their services accordingly. It may involve addressing issues related to accessibility, resource availability, or the overall user experience to better align with the expectations of frequent library users.

Furthermore, the negative association between academic program and satisfaction suggests that the students who enrolled in three-year, four-year, or other academic programs appear to have varying satisfaction levels. Program-specific needs, curriculum structures, or the nature of academic requirements could influence this variance. Libraries should explore these program-specific nuances to tailor their services to the unique demands of different academic disciplines, ensuring that resources and facilities align with the diverse academic pursuits of their user base.

7. Conclusion

In the context of physical library facilities, the positive associations between satisfaction with service quality and library collection underscore the paramount importance of a responsive and well-curated library environment. The emphasis on service quality highlights the significance of creating a conducive study environment, promptly addressing student needs, and maintaining a supportive staff. The positive impact of a well-curated collection reinforces the importance of aligning resources with the academic curriculum, covering relevant materials, and catering to diverse learning preferences. The intriguing observation that information quality, perceived usefulness, and ease of use do not significantly influence satisfaction with the physical library suggests that students prioritize the library's responsiveness and the quality of its collection over other considerations. This nuanced insight challenges traditional assumptions about the factors driving satisfaction in physical library spaces.

Shifting to digital library facilities, the study reveals that the key determinant of satisfaction is the quality of available information. Students express higher satisfaction when digital resources are up-to-date, well-organized, and seamlessly integrated with the academic curriculum. The inverse relationship between the size of the digital library collection and satisfaction suggests that users prioritize relevance and accessibility over sheer volume. This underscores the need for libraries to focus on content curation tailored to user needs and preferences, rather than indiscriminate expansion. The perceived usefulness of digital resources emerges as a critical factor influencing satisfaction in the digital library landscape, highlighting the transformative role of technology in academic success and enriched learning experiences.

Furthermore, examining controlled variables unveils additional layers of complexity in user satisfaction. The positive association between study year and satisfaction implies an evolving relationship, emphasizing the need for libraries to adapt services to meet changing needs at different academic stages. The negative association between library usage patterns and satisfaction suggests frequent users may have heightened expectations, necessitating a more targeted approach to meet specific needs. Additionally, the negative association between academic program and satisfaction underscores the importance of recognizing and responding to the unique needs of different academic disciplines.

8. Recommendations

Recognize and respond to the unique demands of different academic programs by collaborating with faculty and customizing library services and resources accordingly.

Invest in responsive and user-friendly services, cultivating a positive environment with approachable and knowledgeable staff to meet student needs promptly.

Continuously assess and curate library collections to align with the academic curriculum, ensuring relevance, accessibility, and diversity of materials, both in physical and digital formats.

Emphasize the quality of digital information, ensuring it is up-to-date, well-organized, and integrated with the academic curriculum. Acknowledge the critical role of digital resources in academic success.

Recognize and adapt to evolving user trends, tailoring library services to meet changing needs at different academic stages and providing targeted support for frequent library users. Regularly gather and utilize user feedback to inform improvements.

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