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Assessing the Impact of Library Website Quality on User Satisfaction: A Structural Equation Modeling Approach at the University of Ruhuna

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ABSTRACT

Academic libraries are essential in the modern technology environment as they provide a wide range of information and facilities through their websites, contributing to the achievement of educational goals. The quality of these digital platforms is growing in importance as they influence users' experiences and academic performance. This study aims to identify the factors that are connected with library website quality and develop a model that evaluates the effect of the quality of the library website (QoW) on user satisfaction for academic achievement (AA) by comparing service quality within the library (QoLP) and non-library website quality (QoNLW) at the University of Ruhuna using Structural Equation Modeling (SEM). For this purpose, a survey was carried out among 591 undergraduates at University of Ruhuna through a structured questionnaire. This study revealed that information quality (QoI), usability quality (QoU), and service interaction quality (QoSI) are the three main factors influencing library website quality throughout factor analysis. The SEM model showed that the library website quality explained 79.9% of the variation in user satisfaction. The study found that QoSI, QoU, QoI significantly impacted user satisfaction. Subsequently, QoW and QoLP significantly influenced academic achievement, while QoNLW had a strong impact. These results can serve as a valuable reference for university library administrators to improve the services provided on the library website and ensure students' academic achievements by helping them develop and utilize necessary skills.

Keywords: Academic achievement, Factor analysis, Information quality, Service interaction quality, Usability quality

1 Introduction

In view of the rapidly changing online perspective, website quality analysis has become more essential to businesses, educational organizations, and researchers equally. Various researchers have developed frameworks for measuring website quality, highlighting dimensions such as usability, information quality, and service interaction quality. User-centered evaluations play a pivotal role in determining website quality, as evidenced by studies conducted by Barnes and Vidgen (2000), Loiacono et al. (2002), and Napitupulu (2017).

It is essential to concentrate on academic library website quality for the reason it has become a key indicator in affecting academic success. Adeyinka (2019) analyzed undergraduate students' satisfaction with access to the University Library Websites. Hamdani et al. (2022) examined key dimensions of website quality on user satisfaction in the context of the AbdurRab University library by employing statistical techniques like multiple linear regression and importance-performance analysis.

A comprehensive approach to analyzing complex relationships among variables is provided by Structural Equation Modeling (SEM), recommended by Anderson and Gerbing (1988). Bentler (1990) discussed comparative fit indexes (CFI) in SEM models. Collier (2020) revealed guidance on utilizing SEM with the AMOS software. In the last few decades, several studies highlighted the importance of SEM. Alam and Mezbah-ul-Islam (2023) examined the impact of service quality on user satisfaction in public university libraries in Bangladesh using structural equation modeling (SEM). Griadhi et al. (2018) explored the effect of library service quality on achievement motivation and learning achievement of Undiksha students in Bali, Indonesia. The research conducted by Gyau et al. (2021) investigated the library usage frequency patterns among international students at Jiangsu University Library through library resources on library premises, library web pages, and non-library resources. Koo et al. (2011) examined the relationship between website quality, user expectations, confirmation, and satisfaction, focusing on the website of the Korean National Cancer Information Center.

In Sri Lanka, many studies have been done on evaluating library website quality effect on user satisfaction. Ramanayaka et al. (2018) have been studied in the context of library websites in Sri Lanka with the main purpose of exploring the relations between different dimensions of website usability and their impact. Illangarathne (2018) applied Structural Equation Modeling (SEM) to identify determinants of users' satisfaction with e-library services in academic libraries in Sri Lanka.

The University of Ruhuna offers valuable information on its library's website to support research, learning, and academic success. However, there is

limited research on how much a library's website quality affects user satisfaction and enhances academic performance. By reviewing existing literature to address this research gap, it becomes observable that identifying the key dimensions of library website quality that influence user satisfaction for academic outcomes, together with how all of these factors interact within a comprehensive framework. The objective of this study is to identify the factors that are connected with library website quality and develop a model that evaluates the effect of user satisfaction on library website quality with non-library website quality and service quality on library premises for academic achievement at the University of Ruhuna using Structural Equation Modeling. The study is important as it provides actionable recommendations for optimizing the library website to improve user satisfaction and positively impact academic achievement by creating a more supportive and effective learning environment for undergraduates at University of Ruhuna.

2 Methodology

2.1 Research Model

This research aims to evaluate the effect of library website quality on user satisfaction for academic achievement at University of Ruhuna. This study employs two different approaches to evaluate academic achievement and the library website quality as in Figure 1 (a) and (b). The constructs included in the research models were derived from the variables in Figure 2.

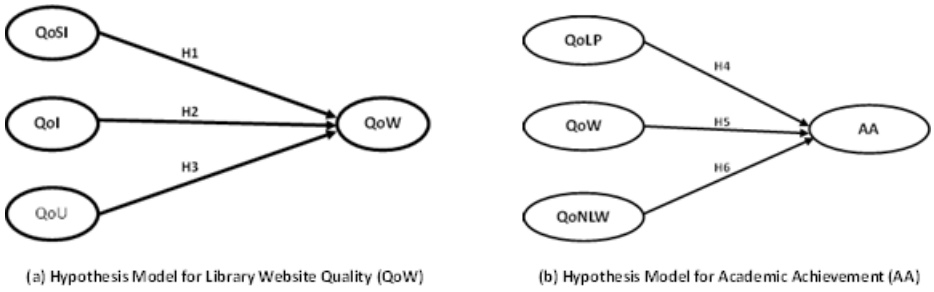

Fig. 1: Hypotheses Models

2.2 Research Hypotheses

The following hypotheses were formulated in Table 1 based on the research gap and objectives of the study.

2.3 Data Collection

A structured questionnaire using a five-point likert scale was employed to collect primary data. The population of this study comprised the users of the

Construct	Questionnaire Items	Code
Service Interaction Quality (QoSI)	The library website is easy to operate and learn by its users.	QW1
	The library website is clear and understandable.	QW2
	The library website has an attractive or attractive appearance.	QW3
	The library website is competitive with similar websites.	QW4
Information Quality (QoI)	The library website provides appropriate and accurate information.	QW5
	The library website provides reliable information.	QW6
	The library website provides timely information (up to date).	QW7
	The library website provides relevant information.	QW8
	The library website provides easy-to-understand information.	QW9
	The library website presents information in the appropriate format.	QW10
	There is a good belief about the library website.	QW11
	The library website guarantees the security of users' personal information.	QW12
	The information that the library website provides is of high quality.	QW15
Usability Quality (QoU)	The library website provides space for personalization of users.	QW13
	The library website makes it easy to communicate with service providers.	QW14
	The library website is organized thematically.	QW16
	The library website uses letters that are easy to read.	QW17
	The library website uses the appropriate color display.	QW18
	The library website presents a display design that is in accordance with its function.	QW19
	The library website has a consistent menu structure and layout.	QW20
	The library website provides links that work well.	QW21
	The library website can be accessed at any time.	QW22
	It did not get long time when opening/logging into the library website.	QW23
	The library website runs fine using the default computer browser or mobile phone browser.	QW24
Library Website Quality (QoW)	I am satisfied with the services provided by library website.	QW25
	The interaction with library website exceeds my expectation.	QW26
	I feel satisfied when using library website.	QW27
Service Quality on the Library Premises (QoLP)	The library has adequate resources.	QPLR
	Library staff have the willingness to help users promptly and caring performance.	QPLSC
	The physical environment of the library is satisfactory.	QPLF
	I am satisfied with the services that the library provides.	QPLS
Non-library Website Quality (QoNLW)	The non-library websites use vivid and visual images.	QNWD
	The information posted on the non-library websites provide necessary information and always timely update.	QNWI
	The non-library website's privacy policy is clear.	QNWS
	It easy to access links from non-library websites.	QNWC
Academic Achievements (AA)	The service quality on the library premises has a significant impact on AA.	AA1
	The library website quality has a significant impact on the AA.	AA2
	The non-library website quality has a significant impact on the AA.	AA3

Fig. 2: Constructs Derived from Items

Table 1: Research Hypotheses

	Hypotheses
H1	Service interaction quality (QoSI) of library website positively influence user satisfaction
H2	Information quality (QoI) of library website positively influence user satisfaction
H3	Usability quality (QoU) of library website positively influence user satisfaction
H4	Service quality on the library premises (QoLP) has a significant impact on AA
H5	Library website quality (QoW) has a significant impact on the AA
H6	Non-library website quality (QoNLW) has a significant impact on the AA

library website at University of Ruhuna, Sri Lanka, and the sample was determined by using the stratified sampling technique to ensure the proportion representation of the population according to Table 2. It was found that the widely accepted "rules of thumb" in sample size specification in SEM models include, the minimum sample size rule, and the minimum number of cases per parameter (10:1 rule)[Nunnally and Bernstein, 1967].

Table 2: Summary of Data Distribution

	FHSS	FOA	FOAS	FOE	FOFM	FOM	FOMed	FOS	FOT	Total
Population	2628	1178	951	2073	541	2343	1403	2115	1248	14480
Proportion (%)	18	8	6	14	4	16	10	15	9	100
Sample	108	48	36	84	24	96	60	90	54	600

- FHSS– Faculty of Humanities and Social Sciences
- FOA – Faculty of Agriculture
- FOAS – Faculty of Allied Health Sciences
- FOE – Faculty of Engineering
- FOMed – Faculty of Medicine
- FOM – Faculty of Management and Finance
- FOS – Faculty of Science
- FOT – Faculty of Technology
- FOFM – Faculty of Fisheries and Marine Science and Technology

2.4 Factor Analysis

Factor Analysis is a variable reduction method that reduces the set of observed variables in terms of fewer latent factors. Assume a random sample $\boldsymbol{y_1, y_2, ..., y_n}$ from a homogeneous population with mean vector $\boldsymbol{\mu}$ and covariance matrix $\boldsymbol{\Sigma}$. The factor analysis model expresses each variable as a linear combination of underlying common factors $f_1, f_2, ..., f_m$, with an accompanying error term to account for that part of the variable that is unique. For $y_1, y_2, ..., y_p$ as $m < p$ in any observation vector y, the model is as follows,

$$\begin{aligned} y_1 - \mu_1 &= \lambda_{11} f_1 + \lambda_{12} f_2 + ... + \lambda_{1m} f_m + \varepsilon_1 \\ y_2 - \mu_2 &= \lambda_{21} f_1 + \lambda_{22} f_2 + ... + \lambda_{2m} f_m + \varepsilon_2 \\ &\vdots \\ y_p - \mu_p &= \lambda_{p1} f_1 + \lambda_{p2} f_2 + ... + \lambda_{pm} f_m + \varepsilon_p \end{aligned} \tag{1}$$

The coefficients λ_{ij}'s are called loadings and serve as weights, showing how each y_i individually depends on the f's. ε_i is ith unobserved stochastic error term with mean zero and finite variance. These assumptions are natural consequences of the basic model (1) and the goals of factor analysis. For $j = 1, 2, ..., m$ and $i = 1, 2, ..., p$

- $E(F_j) = 0, var(F_j) = 1, cov(F_j, F_k) = 0; j \neq k$
- $E(\varepsilon_i) = 0, var(\varepsilon_i) = \psi_i, cov(\varepsilon_i, \varepsilon_k) = 0; i \neq k$ and ψ_i is specific variance
- $cov(\varepsilon_i, F_j) = 0$; for all i and j

The model for observed random vector $\boldsymbol{Y}$, with p components have mean $\boldsymbol{\mu}$ and covariance matrix $\boldsymbol{\Sigma}$ can be written in matrix notation as,

$$\boldsymbol{Y} - \boldsymbol{\mu} = \boldsymbol{LF} + \boldsymbol{\varepsilon} \tag{2}$$

Where,

- $\boldsymbol{Y} = (y_1, y_2, ..., y_p)'$; a random vector with p variables
- $\boldsymbol{\mu} = (\mu_1, \mu_2, ..., \mu_p)'$; mean of Y
- $\boldsymbol{F} = (F_1, F_2, ..., F_m)'$; common factor ($m << p$)
- $\boldsymbol{\varepsilon} = (\varepsilon_1, \varepsilon_2, ..., \varepsilon_p)'$; uniqueness
- $\boldsymbol{L} = \begin{pmatrix} l_{11} & l_{12} & ... & l_{1m} \\ l_{21} & l_{22} & ... & l_{2m} \\ \vdots & \vdots & \vdots & \\ l_{p1} & l_{p2} & ... & l_{pm} \end{pmatrix}$; loading of the variables into the factors

There are two types of factor analysis, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The main objective of factor analysis's EFA technique is to determine the underlying correlations between the variables under evaluation. Researchers frequently use it to find a set of latent constructs underlying a battery of measured variables while developing

a scale, a collection of questions intended to measure a certain study topic. EFA is necessary to identify underlying factors for a set of measured variables. Several criteria have been proposed for choosing the number of factors (m).

1. Choose m equal to the number of factors necessary for the variance accounted for to achieve a predetermined percentage, 80%.

2. Choose m equal to the number of eigenvalues greater than the average eigenvalue.

3. Use the scree test based on a plot of the eigenvalues of the sample covariance matrix or correlation matrix. If the graph drops sharply, followed by a straight line with a much smaller slope, choose m equal to the number of eigenvalues before the straight line begins.

4. Test the hypothesis that m is the correct number of factors, $H_0 : \Sigma = LL^{'} + \psi$, where L is $p \times m$.

Confirmatory factor analysis (CFA) was performed to predetermine the factor structure and verify the reliability and validity of the constructs.

2.5 Structural Equation Modeling

A comprehensive statistical method called Structural Equation Modeling (SEM) implies researchers investigate and examine the relationships between observable variables and underlying latent constructs. The two main components of SEM are the structural model and the measurement model. The measurement model quantifies linkages between (i) Hypothetical constructs, which are known but unobservable components, and (ii) Observed variables, which represent a specific hypothetical construct in the form of a linear combination. The structural equation model framework can be summarized into three matrix equations, two for the measurement model component and one for the structural model component (Grace, 2006). The measurement model for exogenous (x) and endogenous (y) latent variables can be written as;

$$\begin{aligned} x &= \lambda\xi + \delta \\ y &= \gamma\eta + \epsilon \end{aligned} \tag{3}$$

where,

- x is an observed exogenous variable
- ξ is an exogenous latent variable

- δ is a measurement error
- λ is a factor loadings relating x to ξ
- y is an observed endogenous variable
- η is an endogenous latent variable
- ϵ is a measurement error for the observed endogenous variables
- γ is a factor loadings relating y to η

The structural model component as relationships among latent construct variables can be written as,

$$\eta = \beta\eta + \Gamma\xi + \zeta \tag{4}$$

where,

- β is a path coefficient describing the relationships among endogenous latent variables
- Γ is path coefficients describing the linear effects of exogenous variables on endogenous variables
- ζ is an error of endogenous variables

A confirmatory method is a common technique used by researchers when utilizing SEM. It involves creating a ”model” of interactions between variables of interest and then looking for evidence in the observed data to support the directionality and significance of those interactions. A hypothesis about the relationship between the relevant study constructs is the first step in the SEM process.

3 Results and Discussion

3.1 Descriptive Statistical Perspective

The questionnaire with a five-point Likert scale was distributed among the 591 library end users to capture demographic information, including faculty, gender, and level of study. The data collected through the surveys were analyzed using Statistical Packages for Social Science (SPSS) version 26. According to this analysis, 55.7% of the respondents were female and 44.3% were male. The highest number of respondents came from the Faculty of Humanities and Social Sciences, accounting for 17.6%, while the Faculty of Fisheries and Marine Sciences and Technology had the lowest representation at 5.9%. The demographic information about the respondents is summarized in Figure 3.

Demographic Variables		Frequency	Percent	Cumulative Percent
Faculty	FHSS	104	17.6	17.6
	FOA	48	8.1	25.7
	FOAS	40	6.8	32.5
	FOE	84	14.2	46.7
	FOFM	35	5.9	52.6
	FOM	92	15.6	68.2
	FOMed	56	9.5	77.7
	FOS	85	14.4	92.0
	FOT	47	8.0	100.0
	Total	591	100.0	
Year	1	88	14.9	14.9
	2	189	32.0	46.9
	3	184	31.1	78.0
	4	130	22.0	100.0
	Total	591	100.0	
Gender	F	329	55.7	55.7
	M	262	44.3	100.0
	Total	591	100.0	

Fig. 3: Demographic Information

3.2 Exploratory Factor Analysis (EFA)

In this study, the factors in a principal component analysis with VARIMAX rotation were identified using the Kaiser criterion. The eigenvalues of the different variables are shown on the scree plot in Figure 4. With the scree plot, the eigenvalues tended to decrease significantly in the range of 1-3 factors. However, the eigenvalues significantly reduced when the number of components increased. As a result, three factors affecting the library website quality which are usability quality, service interaction quality, and information quality were appropriate.

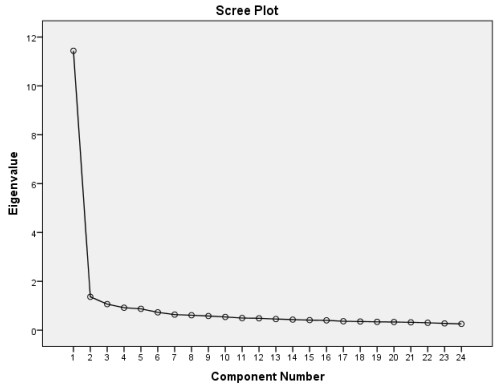

Fig. 4: Scree Plot

3.3 Reliability Verification

Cronbach's alpha is a measure of internal consistency reliability commonly

used to assess the reliability of scales or measures within a research study. Furthermore, it can be observed in Table 3, that the estimated values of the constructs were higher than the suggested threshold of 0.70, indicating a model with good internal consistency and dependability when it comes to relationship measurement.

Table 3: Cronbach's Alpha Reliability Results

Construct	No of Items	Cronbach's Alpha
QoSI	4	0.796
QoI	9	0.910
QoU	11	0.909
QoW	3	0.839
QoLP	4	0.824
QoNLW	4	0.802
AA	3	0.719

3.4 Validity Test

The Bartlett's test of sphericity is used to ensure the data has adequate correlations among the variables. All of the KMO values (QoSI=0.748, QoI=0.936, QoU=0.932, and QoW=0.722) for data validity are near to 1, and it has been found that all Bartlett's tests were significant at 5% level of significance.

Additionally, as Figure 5(a) demonstrates each indicator shows loading greater than 0.50 ($p < 0.001$) on the corresponding components. They remained in the measurement model since their factor loadings were significant. Factor analysis showed that all the items were loaded on the factors from 11.438 to 0.257 where the eigenvalue of the Rotation sums of Squared Loadings was from 5.405 to 3.955 for three factors which were higher than the threshold of one (Andaleeb and Simmonds, 1998), indicating three variables were significant for conducting factor analysis as shown in Figure 5(b).

As indicated in Table 4, each construct was found to have a composite reliability (CR) higher than the threshold level of 0.60 and an Average Variance Extracted (AVE) higher than the threshold level of 0.50.

Table 4: Convergent Validity Results

	CR	AVE
QoSI	0.801	0.504
QoI	0.911	0.533
QoU	0.910	0.501

Factors	Items	Estimate
Service Interaction Quality (QoSI)	QW1	0.753
	QW2	0.77
	QW3	0.704
	QW4	0.601
Information Quality (QoI)	QW5	0.756
	QW6	0.73
	QW7	0.708
	QW8	0.748
	QW9	0.781
	QW10	0.762
	QW11	0.718
	QW12	0.645
	QW15	0.717
Usability Quality (QoU)	QW13	0.648
	QW14	0.676
	QW16	0.697
	QW17	0.681
	QW18	0.716
	QW19	0.733
	QW20	0.737
	QW21	0.729
	QW22	0.632
	QW23	0.666
	QW24	0.703

(a) Constructs Factor Loading

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.438	47.659	47.659	5.405	22.521	22.521
2	1.366	5.690	53.349	4.510	18.792	41.313
3	1.067	4.444	57.793	3.955	16.480	57.793
4	.919	3.827	61.621			
5	.874	3.642	65.263			
6	.730	3.041	68.303			
7	.637	2.655	70.958			
8	.612	2.548	73.507			
9	.581	2.419	75.926			
10	.541	2.254	78.180			
11	.496	2.068	80.248			
12	.487	2.028	82.276			
13	.456	1.900	84.176			
14	.432	1.800	85.976			
15	.412	1.716	87.692			
16	.401	1.673	89.364			
17	.365	1.520	90.884			
18	.354	1.475	92.360			
19	.341	1.420	93.780			
20	.335	1.395	95.176			
21	.321	1.337	96.513			
22	.303	1.264	97.776			
23	.277	1.153	98.930			
24	.257	1.070	100.000			

(b) Factor Analysis

Fig. 5: Constructs Factor Loading and Factor Analysis

Additionally, Average Variance Extracted (AVE) in Table 5 is higher than the constructs' squared correlation. These findings revealed the measurement model's significance in a single dimension and convergence validity.

Table 5: Discriminant Validity

	QoSI	QoU	QoI
QoSI	0.708		
QoU	0.693	0.704	
QoI	0.628	0.486	0.728

3.5 Confirmatory Factor Analysis (CFA)

Figure 6 represents the initial measurement model following the completion of the CFA analysis for every exogenous variable. Since every item in each construct is greater than 0.6, the item reduction process was not carried out. As a result, the SEM-produced Modification Indices (MI) table was used to

analyze the redundant elements in the initial measurement model. When two items have MI values greater than 15, they are considered highly connected and will either be deleted or put as a free parameter estimate. To check the model's fitness, the model is re-specified until one-dimensionality is obtained.

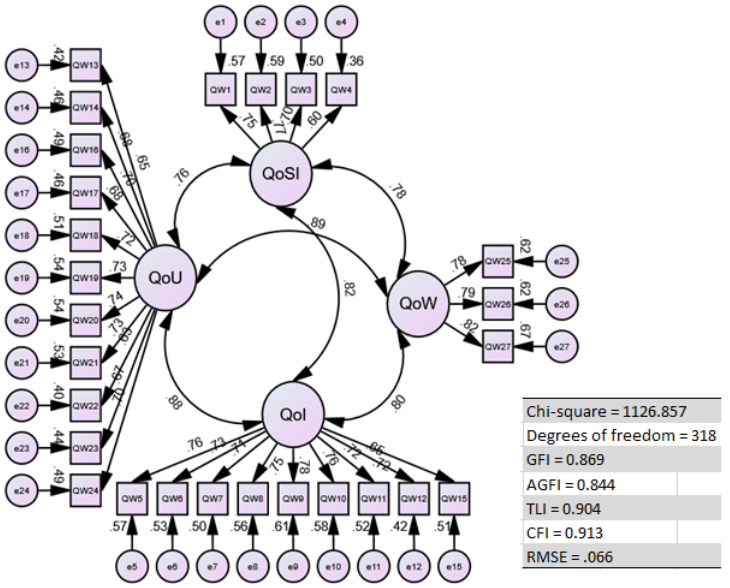

Fig. 6: Initial Measurement Model for Library Website Quality (QoW)

Figure 7 illustrates how the measurement model exceeded the fitness index requirements by removing the variables QW4 from construct QoSI, QW6, QW12, and QW15 from construct QoI, and QW13, QW14, QW22, and QW23 from construct QoU. The constructs' Cronbach's alpha reliability values (QoSI = 0.789, QoI = 0.881, and QoU = 0.883) were higher than the suggested threshold of 0.70 after items were removed to satisfy the fitness index requirements.

3.6 Structural Equation Modeling (SEM)

Structural Equation Model generated through AMOS was used to test relationships. A good-fitting model was accepted if the value of the CMIN/df, the goodness-of-fit (GFI) indices (Hair et al., 2010); the Tucker and Lewis (1973) index (TLI); the Confirmatory fit index (CFI) (Bentler, 1990) is ≥0.90 (Hair et al., 2010). In addition, an adequate-fitting model was accepted if the AMOS computed value of the standardized root means square residual (SRMR) < 0.05, and the root mean square error approximation (RMSEA) is between 0.05 and 0.08 (Hair et al., 2010). The fit indices for the model were within the acceptable range: CMIN/df =2.512, the goodness-of-fit (GFI) =0.939, TLI =0.959, CFI =0.966, SRMR =0.0346, and RMSEA =0.051.

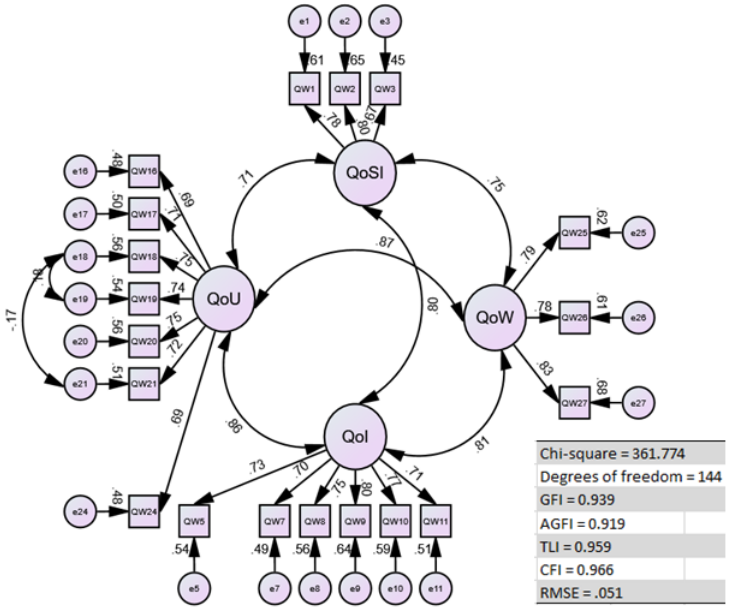

Fig. 7: Re-specified Measurement Model for Library Website Quality (QoW)

The squared multiple correlation was 0.799 for library website quality, this shows that 79.9% variation in library website quality is accounted for by service interaction quality, information quality, and usability quality.

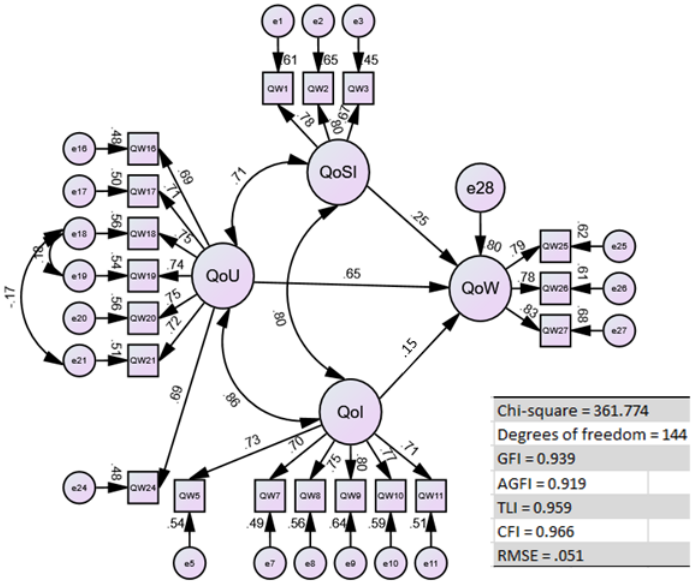

Fig. 8: Structural Equation Model for Library Website Quality (QoW)

The measurement equation models identified are;
Service Interaction Quality(exogenous)
QW1 = 0.78*QoSI + 0.61
QW2 = 0.80*QoSI + 0.65
QW3 = 0.67*QoSI + 0.45

Information Quality(exogenous)
QW5 = 0.73*QoI +0.54
QW7 = 0.70*QoI + 0.49
QW8 = 0.75*QoI + 0.56
QW9 = 0.80*QoI + 0.64
QW10 = 0.77*QoI + 0.59
QW11 = 0.71*QoI + 0.51

Usability Quality(exogenous)
QW16 = 0.69*QoU + 0.48
QW17 = 0.71*QoU + 0.50
QW18 = 0.75*QoU + 0.56
QW19 = 0.74*QoU + 0.54
QW20 = 0.75*QoU + 0.56
QW21 = 0.72*QoU + 0.51
QW24 = 0.69*QoU + 0.48

Quality of library website (endogenous)
QW25 = 0.79*QoW + 0.62
QW26 = 0.78*QoW + 0.61
QW27 = 0.83*QoW + 0.68

The structural equation model can be written as;
QoW = 0.15*QoI + 0.25*QoSI + 0.65*QoU

Furthermore, this study also investigated how library website quality, non-library website quality (Google, YouTube, etc.), and service quality within library premises affect academic achievement. According to Figure 9, the values of model performance indicators such as RMSEA =0.075, CFI = 0.934, TLI = 0.916, GFI= 0.935, and Chisq/df = 4.34 indicate that all indicators are significant and achieved the model criteria.

The measurement equation models identified are;
Service Quality on Library Premises(exogenous)
QPLF = 0.74*QoLP + 0.55
QPLR = 0.70*QoLP + 0.49
QPLS = 0.80*QoLP + 0.64
QPLSC = 0.70*QoLP + 0.49

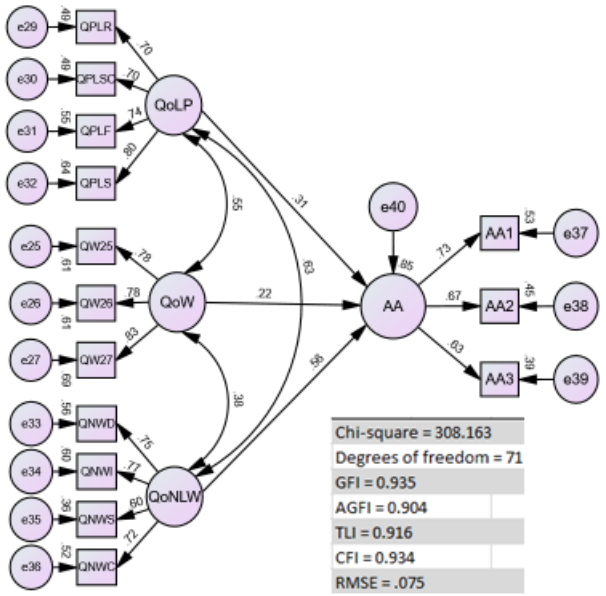

Fig. 9: Structural Equation Model for Academic Achievement (AA)

Non-Library Website Quality(exogenous)
QNWC = 0.72*QoNLW + 0.52
QNWD = 0.75*QoNLW + 0.60
QNWI = 0.77*QoNLW + 0.59
QNWS = 0.60*QoNLW + 0.36

Library Website Quality(exogenous)
QW25 = 0.78*QoW + 0.61
QW26 = 0.78*QoW + 0.61
QW27 = 0.83*QoW + 0.69

Academic Achievement (endogenous)
AA1 = 0.73*AA + 0.53
AA2 = 0.67*AA + 0.45
AA3 = 0.63*AA + 0.39

The structural equation model can be written as;
AA = 0.22*QoW + 0.31*QoLP + 0.56*QoNLW

3.7 Hypothesis Testing

Finding independent variables that have a significant relationship with the dependent variables is the objective of hypothesis testing. SEM was used for this study to examine hypotheses. Through other factors declared in between the other two variables and direct influence from one variable to another, SEM

reveals information about the predicted impact. AMOS 26.0 was used to conduct this investigation.

Table 6: Hyothesis Testing Results for Library Website Quality (QoW)

Hypothesis	Path Coefficient ($\hat{\beta}$)	S.E	C.R	p-value	Decision ($p - value < 0.001$)
H1:QoSI $\longrightarrow$ Satisfaction	0.259	0.060	3.789	0.000	Highly Significant
H2:QoI $\longrightarrow$ Satisfaction	0.157	0.017	9.235	0.000	Highly Significant
H3:QoU $\longrightarrow$ Satisfaction	0.652	0.093	7.752	0.000	Highly Significant

The findings of testing the current study hypotheses are shown in Table 6. The 'Decision' column presents the outcome of the p-value, which indicates if the hypothesis was supported or not. According to the standardized coefficients beta values ($\hat{\beta}$), user satisfaction was significantly impacted by the service interaction quality, information quality, and usability quality of the library website. The coefficient beta values ($\hat{\beta}$) mean that a 1% increase in the service interaction quality, information quality, and usability quality of the library website is predicted to result in a 2.59%, 1.57% and 6.52% increase in user satisfaction respectively.

Table 7: Hyothesis Testing Results for Academic Achievement (AA)

Hypothesis	Path Coefficient ($\hat{\beta}$)	S.E	C.R	p-value	Decision ($p - value < 0.001$)
H4:QoLP $\longrightarrow$ AA	0.311	0.049	5.125	0.000	Highly Significant
H5:QoW $\longrightarrow$ AA	0.227	0.041	4.588	0.000	Highly Significant
H6:QoNLW $\longrightarrow$ AA	0.566	0.057	9.357	0.000	Highly Significant

In addition, Table 7 validates the findings from the SEM, showing that each of the three paths in the proposed model was found to be statistically significant. It was confirmed by the substantial correlation between library website quality and academic achievement ($\hat{\beta}$=0.227). This demonstrates that library website quality can be significantly predicted by academic achievement. Positive and significant path coefficients were found between academic achievement and non-library website quality (Google, YouTube, etc.) ($\hat{\beta}$=0.566). The higher the level of academic achievement, the higher the user satisfaction. Also, there was a positive correlation between service quality on library premises and academic achievement ($\hat{\beta}$=0.311).

4 Conclusion

This study aims to investigate aspects of the University of Ruhuna library's website quality affected user satisfaction. The primary analysis was conducted through a descriptive perception, taking into consideration the preferred method of accessing resources for academic achievement. The results revealed that non-library websites are the most preferred resource for academic purposes. This study found strong internal consistency in each construct, as indicated by Cronbach's alpha, and adequate correlations among variables, confirmed by Bartlett's test of sphericity. Moreover, the application of Confirmatory Factor Analysis (CFA) and hypothesis testing using Structural Equation Modeling (SEM) demonstrated strong associations among the variables. According to the survey, the University of Ruhuna Library's user satisfaction was shown to be significantly and positively influenced by the quality of information, service interactions, and usability as demonstrated by the significant results of the SEM approach. Furthermore, this study analyzed the quality of library websites and services provided within library premises as significant factors affecting academic achievement. However, the impact of non-library website quality's significantly higher contribution emphasizes the need to utilize a wider digital environment to support academic success for students. As a recommendation, library authorities should prioritize improving information quality and expanding access facilities in line with user expectations to address the lowest satisfaction level among the three factors to enhance the necessary skills to succeed in the academic achievements of university students. Future studies can expand the scope of this study by comparing its results with those of other universities' libraries to pinpoint best practices and potential areas for development. Moreover, the comprehensive impact assessment can be conducted to measure the direct influence of academic achievement on broader educational outcomes such as student retention, graduation rates, and career success.

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