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WebQual and Webpage Performance on the Library Website of Universitas Sumatera Utara

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ABSTRACT

Libraries are one of the measuring tools universities use to improve rankings in Webometrics; already, web-based libraries are an added value for universities. This study aims to determine the library Website's impact on students' satisfaction at USU and the Website's performance. The methodology of the study is mixed. The sample determination used purposive sampling and obtained the results of 350 respondents who used the library website The findings show that usability, user, service, and interface quality positively affect user satisfaction. The research results passed the validity, reliability, and partial (t) tests. Next, the performance measurement results of the USU Library website are below the indicator. The study found a positive relationship between quality and user satisfaction, although the site's performance could be improved.

Keywords: Website quality; Library user satisfaction; Website performance

1. INTRODUCTION

University libraries featured prominently in the Webometrics rankings, adding value to websites measuring library reputation and service to users. The academic community, especially students and lecturers, as digital natives, needs access to the library for research support and to enhance the value of the university. Webometrics assesses the quality of global university websites, including the University of North Sumatra, which plans to become international. The university is trying to improve its website management to become world-class and is currently included in cluster one in Indonesia. This study aims to determine the library website's impact on students' satisfaction at USU and the website's performance. This research analyzes the quality of library websites as an evaluation of libraries.

1.1 Library Website

A digital library is an institution that aims to preserve and produce digital collections grouped by category. It also includes storing and accessing information via the Internet and providing related services[4].

Digital libraries use information technology to serve users, with specialised staff who manage digital collections. Information in digital format is processed, stored, preserved, and distributed to users via the Internet[5].

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Digital libraries are collections of information services and objects made available through digital equipment. This service is designed to meet user needs by providing easy access to information through available digital devices[6].

1.2 Library Webqual

Webqual evaluates a website's quality based on how users perceive it. The researchers adopted WebQual 4.0 methodologies for this study. In summary, a sound information system satisfies users regarding website quality.

The measurement of the research with the Webqual technique will be based on five aspects,

1.2.1 Usability

The usability of a library website involves user experience, including ease of operation, interaction, appearance, and experience during use.

1.2.2 Information Quality

The quality of information provided on the library website is measured by the accuracy, speed, and relevance with which it responds to user requests.

1.2.3 Service Interaction Quality

The quality of service interactions on library websites is shaped by factors such as institutional reputation, data

security, community space, and ease of communication with relevant organisations to build user trust.

1.2.4 User Interface Quality

User interface quality includes the appearance users see, including aesthetic elements such as font type, color palette, image appearance, layout, and web page responsiveness.

1.3 Webpage Performance Theory

It provides several definitions related to web page indicators, which consist of 6 leading indicators: First Contentful Paint, Cumulative Layout Shift, Time to First Byte, Largest Contentful Paint, First Input Delay, and Interaction to Next Paint[8].

2. LITERATURE REVIEW

Previous researchers have researched the impact of library websites on library user satisfaction. This study shows that the quality of the Universitas Padjajaran library website significantly impacts user satisfaction. The quality of the information on the Kandaga website depends on the users' needs[1].

The second finding was processed based on Quality Function Deployment (QFD). The results indicate that Universitas Negeri Yogyakarta students are satisfied with the library website[2].

The third study found a gap between library website users' actual perceptions and ideal expectations. Therefore, the quality of Unhas Library's website still needs to meet the students' expectations[3].

Tri Dharma is the three essential obligations that an educational institution, especially a university, must fulfill. Tri Dharma comprises Education and Teaching, Research and Development, and Community Service. The library website is strategic in implementing the Tri Dharma of Higher Education, which improves the quality of education. This research aims to evaluate website quality, user satisfaction, and the influence of quality on satisfaction. With additional dimensions such as interface quality, digital service quality, and web speed performance, this research supports the digital transformation of the Universitas Sumatera Utara (USU) taken from the links https://library.usu.ac.id/ and https://digilib.usu.ac.id/. This digital transformation is significant as USU continues to advance towards complete digitalisation. The objective of this study is to evaluate the satisfaction of the users and the performance of the website of the University of North Sumatra Library in supporting the digitisation program.

3. METHODOLOGY

This research utilises a method that combines quantitative and qualitative approaches. The quantitative data are derived from website quality and satisfaction studies, while qualitative data is obtained through observation, document review, and direct analysis of website. Quantitative data analysis uses simple linear regression analysis and descriptive analysis.

The sample was taken using an accidental sampling technique. The total sample size of 350 was determined using the Slovin formula with a 5 % error rate. (Table 1).

Table 1. Number of samples based on gender

Gender	Sample	Persentase
Male	89	25.43%
Female	261	74.57%
Amount	350	100%

3.1 Hypothesis Test

Major hypothesis :

H_0: The quality of the USU Libraries site has a minor impact on how satisfied users are with the USU Libraries.

H_1: The quality of the USU Library website considerably influences user satisfaction with the USU Library.

The minor hypothesis with four independent variables:

H_{01}: The USU Library website is user-friendly (Usability).

H_{11}: The USU Library website is challenging to use by users (Usability).

H_{02}: The USU Library website has the quality of information that is following what users want (Information Quality).

H_{12}: The USU Library website does not have the quality of information that users want (Information Quality).

H_{03}: The USU Library website has good service and interaction with users (Service Interaction Quality).

H_{13}: The USU Library website does not have good service and interaction with users (Service Interaction Quality).

H_{04}: The USU Library website has a responsive and aesthetic user interface quality (Service Interaction Quality).

H_{14}: The USU Library website does not have a responsive and aesthetic user interface quality (Service Interaction Quality).

3.2 Data Collection

3.2.1 Questionnaire

The questionnaire structure was used to collect primary data from respondents. Question items are categorised into three dimensions: Usability, Information Quality, Service Interaction Quality, and User Interface Quality based on the Webqual method. The questionnaire consists of 32 items used to measure website quality and 10 items to measure user satisfaction (Fig. 1).

3.2.2 Observations

Observations were conducted to gather additional information that could not be obtained through in-depth interviews.

3.2.3 Document review

The documents referred to as data in this research were collected through journals, books, internet data, news, and documents from parties related to this research.

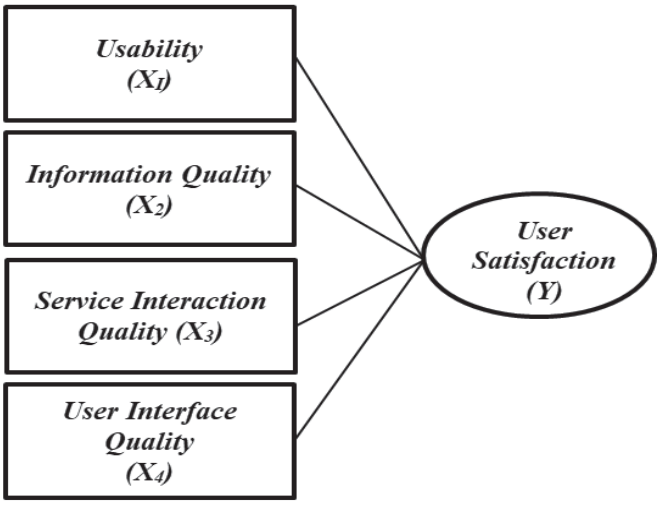

Figure 1. Conceptual framework and research design.

3.3 Data Analysis

Quantitative data are analysed using validity testing with Pearson's product-moment correlation, reliability testing with Cronbach's alpha, and classic hypothesis testing with data normality testing. Researchers used univariate and bivariate tests to see the influence of website quality variables and user satisfaction. This research also provides a model for developing a college library website by conducting a literature study.

4. RESEARCH FINDINGS AND DISCUSSION

4.1 X_1 Usability

4.1.1 Validity Test

The validity of the questionnaire was tested using the Pearson product-moment correlation method with a significance level of 5 % and a confidence level of 95 %. The following results were obtained using SPSS Windows 26.

Table 2. Validity test–usability result

Variable	Indicator	Rcount	Rtable	Result
Usability (X1)	X_{11}	0,178	0.113	Valid
	X_{12}	0.145	0.113	Valid
	X_{13}	0.253	0.113	Valid
	X_{14}	0.241	0.113	Valid
	X_{15}	0.196	0.113	Valid
	X_{16}	0.276	0.113	Valid
User Satisfaction (Y)	Y_{01}	0.792	0.113	Valid
	Y_{02}	0.737	0.113	Valid
	Y_{03}	0.716	0.113	Valid
	Y_{09}	0.788	0.113	Valid
	Y_{10}	0.718	0.113	Valid

The validity test table data results show that the Rcount value for all instruments is higher than the Rtable value. Judging from the distribution table of the Rtable value for the number of respondents, 350 people. The Rtable value is 0.113 and the highest Rcount observed was 0.792. So, based on the results, which show that Rcount>Rtable with the highest value of 0.792>0.113 (Table 2), it can be seen that the instrument on the questionnaire distributed by the researcher gets valid results or the USU Library website is easy to use.

It follows the Theory of Usability Evaluation and Improvement of User Interface Design for the Malang City Mobile Library Application, which states that ease of use is crucial to measuring product success and user satisfaction[7].

4.1.2 Reliability Test

The reliability test uses Cronbach's Alpha method. Data is said to have good reliability if the value is above 0.7 or reaches 0.8-0.9 (Table 3). The results of processing the questionnaire's reliability test data using the SPSS Windows 26 program are presented below.

Table 3. Reliability test–usability result

Cronbach's alpha	N of items
0.827	11

The reliability test analysis output data show that the Cronbach alpha value of the 11-question instruments in variable X1, distributed to 350 respondents via questionnaires, is 0.827. Therefore, based on research rules, the data can be declared reliable because 0.827>0.7, which exceeds the minimum acceptable threshold of 0.70. Therefore, the reliability test of the question instruments for variable X1 is reliable.

4.1.3 Hypothesis Results

In order to evaluate the influence of the independent variables, the researchers carried out a partial test by using the t-test. The data processing results with the program SPSS Windows 26 are shown in the following (Table 4).

The Tcount value shows a positive influence with a value of 5.924, more significant than the Ttable (2.04841) and has a significance value of less than 0.05. Since 5.924 is more significant than 2.04841 and the significance of 0.000 is less than 0.05, we conclude that H01 is accepted and H11 is rejected, which means that the USU Library website variable is user-friendly. The results of research data processing follow the theory that usability affects user satisfaction and significantly affects user satisfaction[1].

Other studies have found that usability quality positively and significantly impacts the overall impression of library.ung.ac.id[7].

Research related to analysing the quality of the Muspera Ministry of Environment and Forestry library website shows website interactions that are easy for the Muspera Library website users to understand. The

Usability Quality variable indicates the level of conformity achieved among respondents who have successfully fulfilled website users' satisfaction or expectations based on the Muspera Library website's performance[8].

However, other studies contradict the X1 hypothesis test, stating that system quality and ease of use do not significantly affect user satisfaction[10].

Other studies also state that usability has no significant effect on user satisfaction, which results from partial hypothesis testing[11].

Table 4. Partial test–usability result

Coefficients[a]						
		Unstandardised coefficients		Standardised coefficients		
Model		B	Std. error	Beta	t	Sig.
1	(Constant)	31.185	2.125		14.677	0.000
	Usability	0.480	0.081	0.665	5.924	0.000

4.1.4 Normality Test

Data normality tests are used to determine whether research data distributions are normal. Normality can be known by observing the graph's shape (Fig. 2).

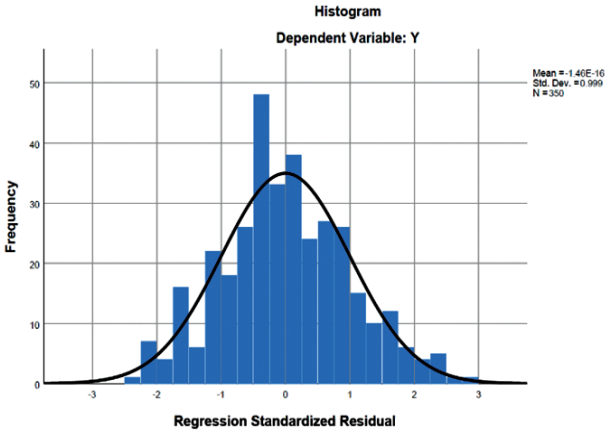

Figure 2. Histogram graph data normality test results - usability.

The shape of the graph follows a bell shape, which means that the data on the Usability variable is normally distributed and meets the data normality requirements.

Then, the normality test uses the standard probability plot graph analysis method by paying attention to the lines that describe the research data, meeting the diagonal line.

The points on the Normal Probability Plot Graph spread and follow the diagonal line (Fig. 3) to ensure that the residuals are normally distributed.

The normality evaluation also includes the Kolmogorov-Smirnov test, which measures the significance level of the research data.

Data that has been normally distributed using the The Kolmogorov-Smirnov method can be considered normal if the p-value is more significant than 0.05 (Table 5).

The test indicates that the data's significance value is 0.06, more significant than the predefined standard value of 0.05 (0.06 > 0.05). The data can be declared normally distributed, so the data model has been regressed properly.

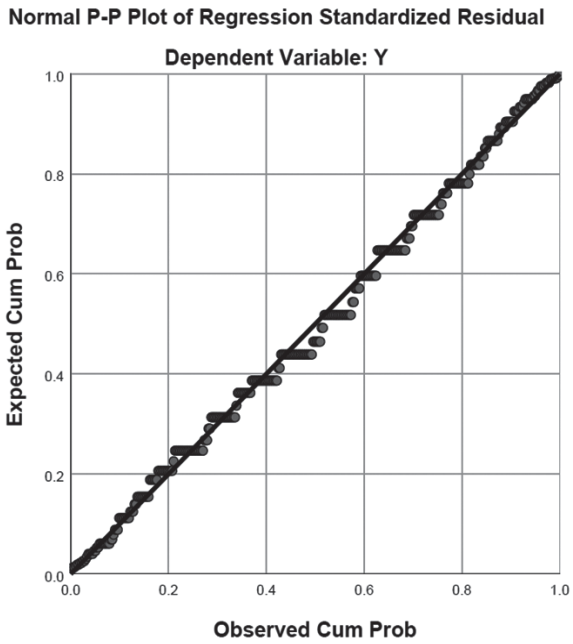

Figure 3. Data normality test results normal probability plot graph.

Table 5. Kolmogorov-Smirnov data normality test results.

One-sample Kolmogorov-Smirnov test		
		Unstandardised residual
N		350
Normal Parameters [a,b]	Mean	0,00000
	Std. Deviation	1.87811894
Most Extreme Differences	Absolute	0.056
	Positive	0.056
	Negative	-0.035
Test Statistic		0.056
Asymp. Sig. (2-tailed)		0.010[c]

4.2 X_2 Information Quality

4.2.1 Validity Test

The results show that Rcount> Rtable, with the highest value of 0.790> 0.113. It can be seen that the instrument on the questionnaire distributed by the researcher gets valid results or that the USU Library website fulfills the three main aspects of information quality: accurate, fast, and relevant (Table 6). These three things become an assessment of whether or not the quality of information from a library website is good.

This aligns with the theory in the research Analysis of the Effect of Website Quality on User Satisfaction on the Library Website, which states that the accuracy of information quality that can meet users' needs will affect the increase in library user satisfaction[9].

Additional research findings also confirm that the quality of information significantly impacts user satisfaction, with a contribution value of 84.9 %[10].

According to this research, the quality of information positively and significantly affects a website's overall impression. Therefore, an increase in information quality will lead to higher user satisfaction[7].

Table 6. Validity test–information quality result

Variable	Indicator	Rcount	Rtable	Result
Information Quality (X2)	X_{21}	0.614	0.113	Valid
	X_{22}	0.514	0.113	Valid
	X_{23}	0.536	0.113	Valid
	X_{24}	0.670	0.113	Valid
	X_{25}	0.627	0.113	Valid
	X_{26}	0.688	0.113	Valid
User Satisfaction (Y)	Y_{1}	0.790	0.113	Valid
	Y_{2}	0.737	0.113	Valid
	Y_{09}	0.790	0.113	Valid
	Y_{10}	0.719	0.113	Valid

4.2.2 Reliability Test

Based on research rules, the data can be declared to have good reliability because 0.919> 0.7. The reliability test for the variable X_2 question instrument has been deemed reliable. (Table 7).

Table 7. Reliability test-information quality result

Reliability statistics X2	
Cronbach's alpha	N of items
0.919	10

Source: Processed by researchers (2023)

4.2.3 Hypothesis Results

From the partial test results 23.093> 2.04841 and significance 0.000> 0.05 (Table 8), it is possible to conclude that H02 is accepted and H12 is rejected, which means that the USU Library website variable has information quality according to users' needs. The research data processing supports the theory that information quality affects and has a significant effect on user satisfaction[1].

Table 8. Partial test-information quality result

Coefficients[a]						
		Unstandardised coefficients		Standardised coefficients		
Model		B	Std. error	Beta	t	Sig.
1	(Constant)	13.176	1.330		9.910	0.000
	Information quality	1.154	0.50	0.778	23.093	0.000

The results of the partial hypothesis tests on H0 and H1 can be interpreted as meaning that the variable of information quality does not significantly affect user satisfaction[11].

Another research study that supports this theory is the statistical analysis of the quality of the UPT Library website at Universitas Islam Negeri Sultan Agung Semarang. The results obtained a significance value of the T-test less than 0.10. This indicates a positive and significant influence on UNISSULA Library users[13].

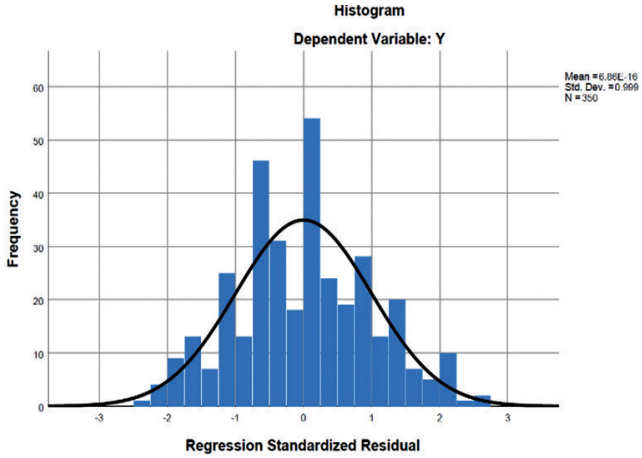

Figure 4. Histogram graph data normality test results–information quality.

4.2.4 Normality Test

The graph follows a bell shape, meaning that the data on the Information Quality variable is normally distributed and meets the data normality requirements (Fig. 4).

Normal Probability Plot Graph The graph spreads and approaches or follows the diagonal line (Fig. 5), which indicates that the residual data follows a normal distribution.

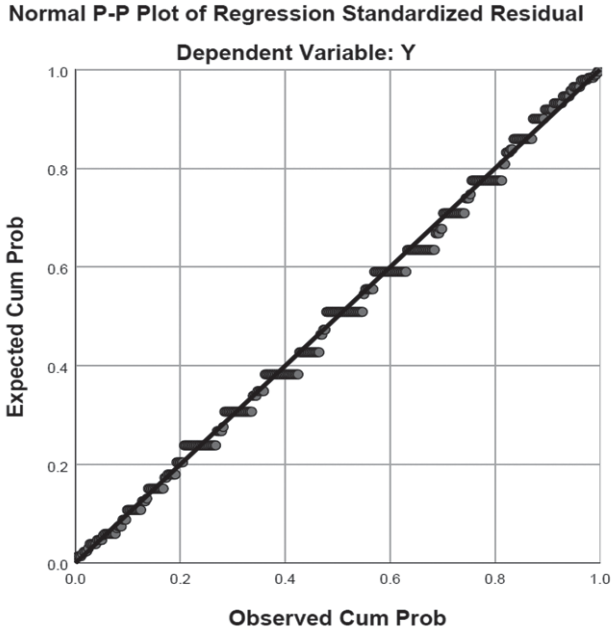

Figure 5. Normal probability plot graph data normality test results–information quality.

The data normality test results indicate that the significance value of the data is 0.030, which is greater than the predetermined standard value of 0.05 (0.030 > 0.05). The data can be declared normally distributed, so the data model has been regressed properly (Table 9).

Table 9. Data normality test results-kolmonogorov-smirnov

One-sample kolmogorov-smirnov test		
		Unstandardised residual
N		350
Normal parameters [a,b]	Mean	0
	Std. deviation	1.89201077
Most extreme differences	Absolute	0.051
	Positive	0.051
	Negative	-0.032
Test statistic		0.051
Asymp. sig. (2-Tailed)		0.030[c]

4.3 X_3 Service Interaction Quality

4.3.1 Validity Test

Table 10. Validity test–service interaction quality result

Variable	Indicator	Rcount	Rtable	Result
Service interaction quality (X3)	X31	0.362	0.113	Valid
	X32	0.301	0.113	Valid
	X33	0.293	0.113	Valid
	X34	0.311	0.113	Valid
	X35	0.275	0.113	Valid
	X36	0.296	0.113	Valid
	X37	0.358	0.113	Valid
	X38	0.266	0.113	Valid
	X39	0.319	0.113	Valid
	X310	0.182	0.113	Valid
User satisfaction (Y)	Y1	0.799	0.113	Valid
	Y2	0.723	0.113	Valid
	Y09	0.787	0.113	Valid
	Y10	0.713	0.113	Valid

Based on the results, which show that $R_{count} > R_{tabel}$ with the highest value of 0.799> 0.113 (Table 10), it can be seen that the instrument on the questionnaire distributed by the researcher gets valid results or the USU Library website fulfills aspects which include website reputation, user data security, community space, and ease of communication between users and the library.

This is in line with the theory in the research Quality Analysis of Ciputra Surabaya University Library Website Using Webqual 4.0 Method and Importance Performance Analysis (IPA), which states that Service Interaction Quality can be seen from several aspects of the site, including having a good reputation and users feeling safe using the site. Users trust the security of their personal information when logging in. The site allows for personalisation and communication within the library community. The information provided is of high quality[14].

Other studies consistent with the results of the present study indicate that the variable quality of service interaction significantly affects user satisfaction based on the results of validity testing with $t_{table} < t_{count}$[11].

4.3.2 Reliability Test

According to research rules, the data can be deemed reliable because the reliability coefficient 0.900 is greater than the minimum threshold of 0.7 (Table 11). Therefore, the reliability test of the questionnaire instrument for variable X_3 is considered reliable.

Table 11. Reliability test-service interaction quality result

Reliability statistics X3	
Cronbach's alpha	N of items
0.900	14

4.3.3 Hypothesis Result

Based on the partial test results, with a significance level of 0.000, which is less than the threshold of 0.05, it can be inferred that H03 is accepted and H13 is rejected (Table 12). The USU Library Website variable has good service and interaction with users. The results of research data processing are based on the theory that Service Interaction Quality affects user satisfaction and significantly affects user satisfaction[1].

The quantitative findings of the survey show that USU libraries have an overall high level of service quality. However, the quality of service in the dimensions "Effect of Service" and "Library as a Place" is high. However, it is not statistically significant[15].

According to the study's regression analysis, the library environment and services have a 26.2 % impact on user satisfaction[17].

The results of this study contradict other studies that state that service interaction quality does not affect user satisfaction. Research related to the Implementation of the Webqual 4.0 Method to Measure the Quality of the UNILA Library UPT Website states that the quality of service interactions on the UNILA Library UPT website, such as a good website reputation, security in transactions and maintaining personal information, a sense of personalisation, a community atmosphere, ease of communicating with the organisation (website manager), and the level of trust in the services/information provided do not affect user satisfaction[9].

Research on website quality evaluation at SMA Negeri 4 Lubuklinggau conducted multiple linear regression tests on Webqual variables and found variables that had no significant effect on website quality. It means that the results of the previous study contradict the findings of this research. The indicator on the Web equal variable is the service interaction quality variable because the significance value is more than 0.05[18].

4.3.4 Normality Test

Based on the test results presented above, the graph follows a bell-shaped curve, which means that the data on the Service Interaction Quality variable is normally distributed and meets the data normality requirement (Fig. 6).

Table 12. Partial test–information quality result

Coefficients[a]						
		Unstandardised coefficients		Standar-dised coefficients		
Model		B	Std. error	Beta	t	Sig.
1	(Constant)	30.700	1.666		18.432	0.000
	Service interaction quality	0.309	0.039	0.387	7.839	0.000

Based on the picture above, the evidence suggests that the points on the Normal Probability Plot Graph spread and approach or follow the diagonal line (Fig. 7). This indicates that the residuals are normally distributed.

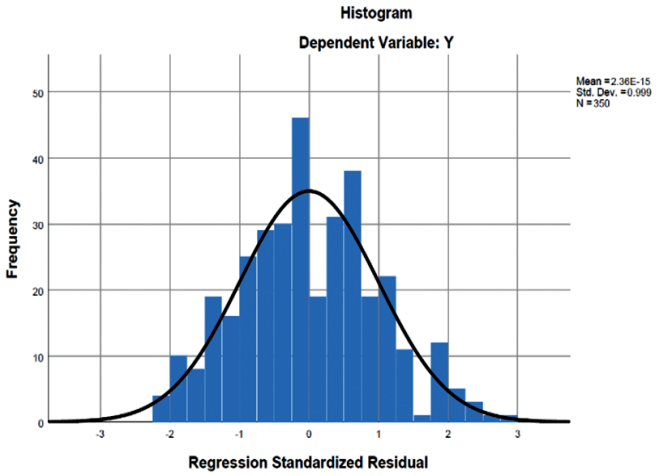

Figure 6. Histogram graph data normality test results–service interaction quality.

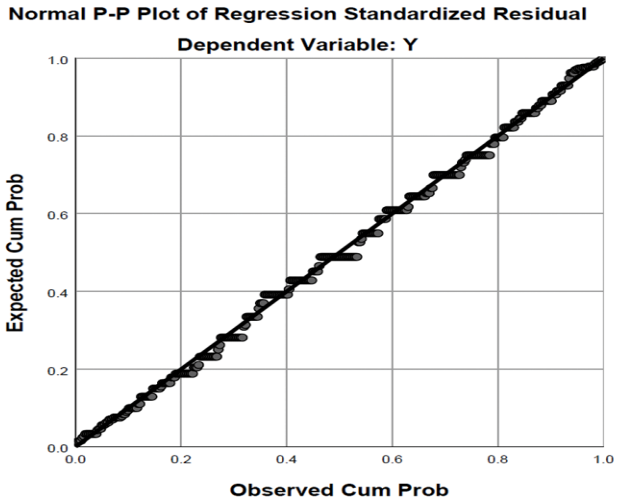

Figure 7. Normal probability plot graph data normality test results–user interface quality.

The data normality test results indicate that the significance value is 0.077, which is greater than the predetermined standard value of 0.05 (0.077 > 0.05) (Table 13). The data can be declared normally distributed, so the data model has been regressed properly.

Table 13. Data normality test results-kolmonogorov-smirnov

One-sample kolmogorov-smirnov test		
		Unstandardised residual
N		350
Normal parameters[a,b]	Mean	0
	Std. deviation	1.81189643
Most extreme differences	Absolute	0.046
	Positive	0.046
	Negative	-0.034
Test statistic		0.046
Asymp. sig. (2-tailed)		0.077[c]

4.4 X_4 User Interface Quality

4.4.1 Validity Test

Based on the results, which show Rcount > Rtable with the highest value of 0.790 > 0.113 (Table 14), it can be seen that the instrument in the questionnaire distributed by researchers obtained valid results or that the University of North Sumatra Library website has an attractive. The web page's responsive appearance makes users comfortable and at home when accessing the University of North Sumatra Library website.

This aligns with the Iwearup.com Web User Interface Analysis research theory, which states that the user interface is critical in a website system because almost every website has one. A poor user interface frustrates users and impacts their productivity and website access experience. A good website user interface design keeps

Table 14. Validity test-user interface quality result

Variable	Indicator	Rcount	Rtable	Result
User interface quality (X4)	X41	0.658	0.113	Valid
	X42	0.585	0.113	Valid
	X43	0.461	0.113	Valid
	X44	0.515	0.113	Valid
	X45	0.496	0.113	Valid
	X46	0.623	0.113	Valid
	X47	0.485	0.113	Valid
	X48	0.500	0.113	Valid
	X49	0.543	0.113	Valid
	X410	0.579	0.113	Valid
User satisfaction (Y)	Y1	0.790	0.113	Valid
	Y2	0.737	0.113	Valid
	Y09	0.790	0.113	Valid
	Y10	0.719	0.113	Valid

visitors on the website and prevents them from leaving quickly[19].

4.4.2 Reliability Test

Based on the research rules, the data can be declared to have good reliability because 0.899>0.7 (Table 15). The reliability test for the variable X_4 question instrument has been deemed reliable.

Table 15. Reliability test-user interface quality result

Reliability statistics X4	
Cronbach's alpha	N of items
0.899	14

4.4.3 Hypothesis Results

The t_{count} value shows a positive effect with a value of 23.417 greater than the t_{table} (2.04841) and a significance value of less than 0.05 (Table 16). Based on the partial test results, 23.417>2.04841 and significance 0.000>0.05, it can be concluded that H_{04} is accepted and H_{14} is rejected. The USU Library Website variable has a responsive and aesthetic user interface quality. The results of research data processing are based on the theory that User Interface Quality affects user satisfaction and significantly affects user satisfaction[1].

The results of the research survey on the effect of Udaya University library web quality on user satisfaction state that satisfaction is a criterion of user satisfaction with electronic resources, the usefulness of the library web and services for users, and that a website that has a complete interface and information will increase the level of user satisfaction.

Table 16. Partial test-information quality result

Coefficients $_X$4						
		Unstandardised coefficients		Standar-dised coefficients		
Model		B	Std. error	Beta	t	Sig.
1	(Constant)	17.132	1.143		14.984	0.000
	User interface quality	0.639	0.027	0.782	23.417	0.000

4.4.4 Normality Test

Based on the test results above, the graph follows a bell-shaped curve, indicating that the User Interface Quality variable data are normally distributed and meets the data normality requirements (Figure 8).

The Normal Probability Plot Graph shows that the points are spread out and follow the diagonal line (Fig. 9). This indicates that the residuals are normally distributed.

The data normality test results indicate a significance value of 0.010, which is greater than the predetermined standard value of 0.05 (0.010> 0.05) (Table 16). The data can be declared normally distributed, so the data model has been regressed properly.

The following comparison results are obtained with webpage performance from other university web libraries such as Universitas Andalas, Universitas Indonesia, Universitas Gadjah Mada, and Institut Pertanian Bogor.

Furthermore, the webpage score obtained on the Universitas Indonesia Library website is 1.77s (FCP), 0.61s (CLS), 1.08s (TTFB), 2.93s (LCP), 02s (FID), and 30s (INP).

The Universitas Gadjah Mada Library website's webpage score is 3.36s (FCP), 0.09 (CLS), 5.34s (TTFB), 7.15s (LCP), 02s (FID), and 21s (INP).

The webpage score obtained on the Institut Pertanian Bogor Library website is 3.84s (FCP), 0.20 (CLS), 2.39s (TTFB), 5.89s (LCP), 17s (FID), and 51s (NIP).

Meanwhile, the results of the USU Library webpage are 3.02s (FCP), 0.09 (CLS), 1.55s (TTBF), 4.66s (LCP), 0.1s (FID), and 24s (INP).

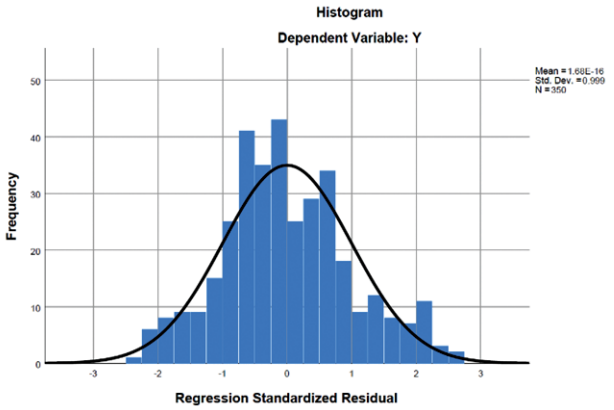

Figure 8. Histogram graph data normality test results-user interface quality.

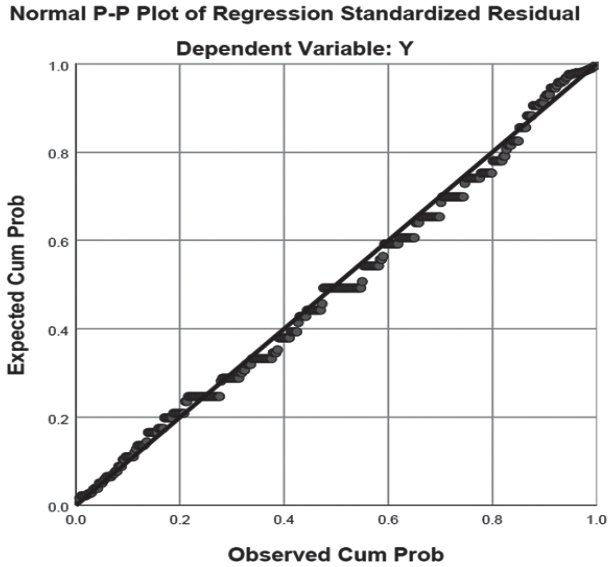

Figure 9. Data normality test results in normal probability plot graph-user interface quality.

5. CONCLUSION

The Universitas Sumatera Utara Library website analysis using the WebQual method showed positive results. Four aspects significantly influenced users:

usability, information quality, service interaction quality, and user interface quality. Although USU students found the website usable, performance tests indicated the need to improve performance metrics. Improving website quality will increase user satisfaction, promote Universitas Sumatera Utara's positive image, and improve its global webometrics ranking.

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