

Website Quality Evaluation Using WebQual 4.0 and Google Lighthouse

Rahmatin Nufus ^{1*}, Nurul Adha Oktarini Saputri ^{2*}

* Informatics Engineering, Bina Darma University
nufuss46matin@gmail.com ¹, nuruladhaos@binadarma.ac.id ²

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ABSTRACT

University websites play a crucial role as a medium for delivering information and academic services to users. High-quality websites can enhance user experience and reflect the institution's credibility. This study aims to evaluate the quality of Bina Darma University's website from both user experience and technical performance perspectives. The research employed a descriptive quantitative approach by combining the WebQual 4.0 method with technical testing using Google Lighthouse. User perception data were collected through a Likert scale-based questionnaire distributed to 80 respondents who are users of Bina Darma University's website, while technical evaluation was conducted on several main web pages using Google Lighthouse, assessing performance, accessibility, best practices, and search engine optimization (SEO). The WebQual 4.0 analysis results indicate that the information quality dimension achieved the highest average score of 3.42, categorized as good, whereas usability scored an average of 3.04 and service interaction quality scored 3.22, both considered fair. Meanwhile, technical testing using Google Lighthouse revealed performance scores ranging from 51–72 and accessibility scores from 68–79, indicating areas needing improvement, while best practices scored 73–96 and SEO scored 83–92, both categorized as good. Overall, the findings suggest that Bina Darma University's website quality ranges from fair to good; however, enhancements in page loading speed, access stability, and accessibility optimization are recommended to further improve the user experience.



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I. INTRODUCTION

University websites serve as internet-based media for delivering information and facilitating communication that can be accessed by users as long as they are connected to the internet [1]. The development of information technology has encouraged various institutions to utilize websites as the primary medium for disseminating information and providing services to the public. In addition to being an effective communication tool, a website also represents the quality of services and the credibility of an institution, including educational institutions [2]. Therefore, the management of websites in educational institutions must be conducted optimally to meet users' information needs and expectations.

Bina Darma University, as a higher education institution, utilizes its official website as the main medium for delivering academic information and services to students and the public. The website provides various information related to academic

activities, administrative services, and general information about the institution. However, users still encounter several challenges, such as difficulty finding specific information and relatively slow page loading times on certain parts of the website. These conditions can affect user experience when accessing information through the university's website, highlighting the need for a comprehensive evaluation of website quality.

Website quality is an essential factor in supporting the effectiveness of information delivery and services. It reflects the extent to which the content and services provided meet user needs and influence their perceptions and interaction experiences [3], [4]. A website is considered to have good quality if the information presented meets user needs clearly, is relevant, and easily accessible [5]. Moreover, a high-quality website can enhance user satisfaction, trust, and loyalty when using web-based services [6]. Conversely, low-quality websites, such as those with difficult navigation, inaccurate

information, or slow interaction processes, have the potential to reduce user satisfaction and encourage users to seek alternative sources of information [7].

In addition to content and service quality, technical aspects also influence user experience. A slow or unresponsive website can cause user frustration and decrease trust in the institution [8]. Website accessibility is also an important indicator, especially for users with special needs or disabilities [9]. All these aspects are closely related to user experience (UX), which encompasses the overall interaction of users with web-based systems, products, or services [10].

To evaluate website quality from the user perspective, various methods have been developed, one of which is the WebQual method. WebQual is a method used to measure the quality of web-based services based on user perceptions. It has several versions, including WebQual 3.0 and WebQual 4.0. WebQual 3.0 focuses on information quality and service interaction quality, whereas WebQual 4.0 is an improved version that adds the usability dimension, providing a more comprehensive evaluation of website quality [11], [12]. WebQual 4.0 measures website quality through three main dimensions: usability, information quality, and service interaction quality [13]. The usability dimension relates to the ease of use and design efficiency of the website, information quality pertains to the completeness and relevance of information, and service interaction quality refers to the security and quality of service interactions provided by the website. Therefore, WebQual 4.0 was selected for this study because it is considered capable of providing a comprehensive overview of website quality based on user interaction experiences.

In addition to user perception-based evaluation, technical evaluation of websites is necessary to objectively assess website performance. One tool that can be used for technical website testing is Google Lighthouse. Google Lighthouse is an analytical tool used to evaluate website quality based on several aspects, including performance, accessibility, best practices, and search engine optimization (SEO) [14], [15]. Technical testing is important to determine the extent to which a website meets good web development standards and provides an optimal user access experience.

Several previous studies have utilized the WebQual 4.0 method to evaluate website quality across various fields, including educational services. Research on higher education websites shows that usability, information quality, and service interaction quality significantly influence user satisfaction [16]. Other studies indicate that information quality and ease of website use are important factors in enhancing user experience in accessing academic information services [17]. Furthermore, evaluations of web-based learning platforms demonstrate that service quality and website interaction impact user satisfaction levels [18].

Although these studies have employed WebQual to assess website quality based on user perception, most still focus on subjective user assessments without considering objective technical evaluations. In fact, technical website quality, such

as performance and accessibility, also plays a crucial role in shaping user experience when accessing web-based services. Therefore, this study combines the WebQual 4.0 method with technical testing using Google Lighthouse to provide a more comprehensive evaluation of website quality.

Based on the discussion above, this study aims to evaluate the quality of Bina Darma University's website using the WebQual 4.0 method based on user perceptions and to conduct technical testing using Google Lighthouse. The combination of these two approaches is expected to provide a more comprehensive analysis of website quality in terms of both user experience and technical performance.

II. METHOD

A. Research Type

This study employs a descriptive quantitative research method. Quantitative research focuses on the collection and analysis of numerical data or data that can be measured statistically [19]. Pendekatan ini digunakan untuk memperoleh hasil yang objektif dan dapat mewakili kondisi sebenarnya berdasarkan hasil pengukuran yang terukur secara sistematis.

The descriptive quantitative approach in this study is used to evaluate the quality of Bina Darma University's website based on two types of data: user perception data and technical website testing data. User perception data were obtained through questionnaires using the WebQual 4.0 method, while technical website data were obtained through testing using Google Lighthouse.

The WebQual 4.0 method is employed to measure website quality from the user perspective through three main dimensions: usability, information quality, and service interaction quality. Meanwhile, Google Lighthouse is used to objectively evaluate the technical quality of the website based on performance, accessibility, best practices, and search engine optimization (SEO). The results of both methods are then analyzed descriptively to provide an overview of Bina Darma University's website quality from both user experience and technical performance perspectives.

In this study, the WebQual 4.0 method was specifically used to assess the website interface quality from the user's perspective through a Likert scale-based questionnaire covering the three main dimensions mentioned above. Google Lighthouse was applied to objectively measure the technical performance of the website across four aspects. The performance aspect focuses on the website's speed and efficiency in loading pages, including loading time, file size, and resource optimization such as images and scripts. The accessibility aspect evaluates the extent to which the website can be accessed by all users, including individuals with disabilities, by reviewing elements such as color contrast, heading structure, and availability of alternative text (alt text) for images. The best practices aspect assesses the website's compliance with modern web development standards, such as HTTPS security, responsive design, and avoidance of risky scripts. The SEO (Search Engine Optimization) aspect

focuses on optimizing the website's structure and content to enhance search engine visibility, including proper use of meta tags, structured headings, and mobile device compatibility.

The results from both methods are then analyzed and compared to provide a comprehensive overview of Bina Darma University's website quality, both in terms of user experience and technical performance. Through this approach, the study aims to produce a more in-depth evaluation to guide targeted system improvements and enhance the overall quality of Bina Darma University's website.

B. Research Object

The object of this study is the Bina Darma University website, which serves as a medium for delivering information and services to students, lecturers, and the general public. The evaluation focused on several main pages of the website that have high traffic, namely the Home page, News page, Scholarship page, and Registration page. These pages were selected because they represent the features and information most frequently accessed by users. The evaluation was conducted using two approaches: user perception assessment through the WebQual 4.0 method and technical website testing using Google Lighthouse to examine performance, accessibility, best practices, and search engine optimization (SEO).

C. Population and Sample

The population of this study comprises all users of the Bina Darma University website, including students, lecturers, and the general public. The sample consisted of 80 respondents selected from this population. The chosen respondents were individuals who had previously accessed the Bina Darma University website, thus having experience in using it. The majority of respondents were students, as they represent the primary users of the website, while the remaining respondents included lecturers and members of the general public.

D. Sampling Technique

The sampling technique used in this study was purposive sampling, which involves selecting respondents based on specific criteria established by the researcher. The criteria for the selected respondents were individuals who had previously accessed the Bina Darma University website. This technique was employed to ensure that the data obtained accurately reflect the perceptions of users with direct experience using the website, making the evaluation of website quality more relevant.

E. Research Instruments

Research instruments are tools used to collect data in a study. In this research, the instruments consisted of a questionnaire and a website testing tool.

a. WebQual 4.0 Questionnaire

The questionnaire was developed based on the WebQual 4.0 method, which is used to measure website quality from the perspective of users. It included several statements reflecting the three main dimensions of WebQual 4.0: usability, information quality, and service interaction quality. Each statement was measured using a five-point Likert scale, ranging from strongly disagree, disagree, neutral, agree, to strongly agree. The questionnaire was distributed to respondents who had previously accessed the Bina Darma University website.

b. Tools Google Lighthouse

The other instrument used in this study was Google Lighthouse, which serves as a tool for conducting technical testing of the Bina Darma University website. This tool was used to obtain evaluation scores for key aspects, including performance, accessibility, best practices, and SEO. The results from Google Lighthouse were used to assess the technical quality of the website objectively.

F. Measurement Scale

The measurement scale used in this study was the Likert scale. The Likert scale was employed to assess respondents' attitudes, opinions, and perceptions regarding the quality of the Bina Darma University website based on the statements included in the WebQual 4.0 questionnaire.

Each statement in the questionnaire provided five response options representing the level of agreement of the respondents. The evaluation categories on the Likert scale used in this study were as follows:

TABLE 1
LIKERT SCALE RATING CATEGORIES

Score	Category
1	Strongly Disagree
2	Disagree
3	Fair
4	Agree
5	Strongly Agree

This scale was used to measure respondents' perceptions of the three main dimensions in the WebQual 4.0 method, namely usability, information quality, and service interaction quality. The respondents' ratings were then processed to obtain average scores, which were used in analyzing the quality of the Bina Darma University website.

G. Instrument Validity and Reliability Test

Validity and reliability tests were conducted to ensure that the questionnaire used in this study could measure the research variables accurately and consistently. The research instrument was developed based on the dimensions of the WebQual 4.0 method, which include usability, information quality, and service interaction quality, consisting of a total of 21 statements.

Validity testing was carried out by examining the Corrected Item–Total Correlation value for each statement. An item is considered valid if the correlation value is greater than 0.30. Based on the test results using statistical software, all statement items had Corrected Item–Total Correlation values greater than 0.30, ranging from 0.645 to 0.871. This indicates that all items in the research instrument are valid and suitable for use in the data collection process.

TABLE 2
INSTRUMENT VALIDITY TEST RESULTS

Item	Corrected Item – Total Correction	Description
X01	0.843	Valid
X02	0.793	Valid
X03	0.834	Valid
X04	0.750	Valid
X05	0.790	Valid
X06	0.742	Valid
X07	0.776	Valid
X08	0.738	Valid
X09	0.831	Valid
X10	0.778	Valid
X11	0.742	Valid
X12	0.777	Valid
X13	0.871	Valid
X14	0.848	Valid
X15	0.645	Valid
X16	0.819	Valid
X17	0.779	Valid
X18	0.855	Valid
X19	0.841	Valid
X20	0.865	Valid
X21	0.848	Valid

Next, a reliability test was conducted to determine the consistency of the research instrument using Cronbach’s Alpha. An instrument is considered reliable if the Cronbach’s Alpha value is ≥ 0.70 . The test results showed a Cronbach’s Alpha value of 0.975 for the 21 statement items. This value exceeds the minimum threshold, indicating that the research instrument is highly reliable.

Thus, the questionnaire used in this study is considered both valid and reliable, making it suitable for measuring website quality based on user perceptions.

TABLE 3
INSTRUMENT RELIABILITY TEST RESULTS

Variable	Number of Items	Cronbach’s Alpha	Description
WebQual	21	0.975	Highly Reliable

H. Data Analysis Technique

This study employed a descriptive quantitative approach to depict the quality of Bina Darma University’s website from two perspectives: user perceptions and technical aspects of the website. The data were analyzed to identify the strengths

and weaknesses of the website and to serve as a basis for developing targeted improvement recommendations. The analysis was conducted in accordance with the data collection methods used, namely the WebQual 4.0 questionnaire and technical testing using Google Lighthouse.

a. WebQual 4.0 Analysis

The WebQual 4.0 questionnaire was used to measure website quality based on user perceptions. WebQual 4.0 consists of three main dimensions: usability, information quality, and service interaction quality, each measured using the Likert scale as described in the Measurement Scale section.

The score for each indicator was calculated using the mean to determine the respondents’ assessment level for each dimension, using the following formula:

$$\bar{X} = \frac{\sum X}{n}$$

Notation:

\bar{X} = mean value

$\sum X$ = sum of all respondent scores

n = number of respondents

Furthermore, to classify the average scores into categories, score intervals were calculated using the following formula:

$$I = \frac{\text{Highest score} - \text{Lowest score}}{\text{Number of categories}}$$

With a maximum score of 5, a minimum score of 1, and a total of 5 categories, the resulting interval is $I = 0.8$. Based on this interval, the WebQual 4.0 evaluation categories are determined as follows:

TABLE 4
WEBQUAL 4.0 RATING CATEGORIES

Score Interval	Category
1,00 – 1,80	Very Poor
1,81 – 2,60	Poor
2,61 – 3,40	Fair
3,41 – 4,20	Good
4,21 – 5,00	Very Good

b. Google Lighthouse Analysis

The technical analysis of the website was conducted using Google Lighthouse, an automated audit tool developed by Google to assess the technical quality of websites. The aspects analyzed included performance, accessibility, best practices, and search engine optimization (SEO).

Testing was carried out by running the website through Google Lighthouse, which generates scores ranging from 0 to 100 for each aspect. These scores indicate the level of

technical quality of the website according to Google’s standards and are categorized as follows table 5.

TABLE 5
GOOGLE LIGHTHOUSE RATING CATEGORIES

Score Range	Category
0 – 49	Poor
50 – 89	Needs Improvement
90 – 100	Good

The results from the WebQual 4.0 and Google Lighthouse analyses were used to provide a comprehensive overview of the website’s quality, both from the user experience perspective and the technical aspects, and can serve as a basis for targeted improvements.

III. RESULTS AND DISCUSSION

A. Respondent Characteristics

This study involved 80 respondents who were users of the Bina Darma University website. The respondents’ characteristics included gender, age, and status, which are presented in the following table 6.

TABLE 6
RESPONDENT CHARACTERISTICS

Chararistic	Category	Number of Respondents	Percentage (%)
Gender	Male	46	57,5
	Female	34	42,5
Age Group	< 20 years	9	11,3
	20 – 25 years	61	76,3
	26 – 30 years	3	3,8
	> 30 years	7	8,8
Status	Student	60	75,0
	Lecturer	5	6,3
	General Public	15	18,7
Access Frequency	Every day	25	31,3
	2 – 3 times/week	23	28,7
	Once a week	13	16,2
	Once a month	1	1,2
	Rarely	18	22,5
Access Purpose	Academic information	42	52,5
	University news/events	30	37,5
	Administrative services	8	10,0

Based on the table, the majority of respondents were students aged 20–25 years. This aligns with the focus of the study, which targeted students as respondents, as they are the primary users of the university website for accessing academic information.

B. Evaluation Results Using WebQual 4.0

This study employed the WebQual 4.0 instrument to evaluate the quality of Bina Darma University’s website based on three main dimensions: Usability, Information Quality, and Service Interaction Quality. The evaluation results and narrative discussion for each dimension are presented as follows table 7.

TABLE 7
WEBQUAL 4.0 EVALUATION RESULTS

Dimension	Average Score	Category	Brief Notes
Usability	3,04	Fair	Ease of use is good; visual appearance, navigation, and loading speed need improvement
Information Quality	3,42	Good	Information is accurate and language is clear; layout and content updates need to be improved
Service Interaction Quality	3,22	Fair	Interaction is fairly good; access stability and technical consistency need to be strengthened

1. Usability

Based on the WebQual 4.0 questionnaire results for the usability dimension, an overview of the ease of use of Bina Darma University’s website from the users’ perspective was obtained. Overall, the evaluation indicated that the website falls into the fair category, with an overall mean score of 3.04.

The Bina Darma University website is relatively easy to use, including for new users (mean score 3.10). The basic structure and navigation flow are generally understandable, resulting in a fairly smooth initial user experience. Text readability and visual elements received the highest scores (3.25), indicating that most users can comprehend the content well.

However, several aspects still require improvement, including the attractiveness of the visual design (2.84), the effectiveness of inter-page navigation (3.03–3.08), and page loading speed (2.83). These findings suggest that while the basic usability is adequate, visual comfort, navigation, and technical performance need enhancement to provide a more optimal and consistent user experience. The respondents’ scores for the usability dimension are presented in detail in the table 8.

TABLE 8
USABILITY DIMENSION EVALUATION RESULTS

No	Indicator	1	2	3	4	5	Total Score	Mean
1	Ease of use for new users	14	12	20	20	14	248	3,10
2	Visual appeal and comfort	12	26	16	15	11	277	2,84
3	Menu structure effectiveness	13	15	22	13	17	246	3,08
4	Smoothness of page navigation	12	14	26	16	12	242	3,03
5	Readability of text and visual elements	10	12	21	22	15	260	3,25
6	Page loading speed	18	20	14	14	14	226	2,83
7	Multi-device accessibility	10	11	26	19	14	256	3,20

2. Information Quality

Based on the WebQual 4.0 questionnaire results for the information quality dimension, an overview of the quality of information presented on the Bina Darma University website from the users' perspective was obtained. Overall, the evaluation indicated that the website's information quality falls into the fair to good category, with an overall mean score of 3.42.

The information provided on the website is generally accurate and reliable (3.58). The language used is easy to understand (3.69), and sboth academic and non-academic service information is considered fairly comprehensive (3.50).

Aspects that require improvement include information layout (3.05) and content update consistency (3.35). This indicates that, although the content is relevant and easy to understand, the quality of information presentation can be enhanced through a more organized layout and more regular content updates, making the website more effective as an official source of university information. The respondents' scores for the information quality dimension are presented in detail in the following table 9.

TABLE 9
INFORMATION QUALITY DIMENSION EVALUATION RESULTS

No	Indicator	1	2	3	4	5	Total Score	Mean
1	Information accuracy and credibility	5	6	25	26	18	285	3,85
2	Information relevance	6	12	20	30	12	270	3,38
3	Information update frequency	9	9	25	19	18	268	3,35

4	Language clarity	6	9	15	24	26	295	3,69
5	Information completeness	8	9	17	27	19	280	3,50
6	Information layout readability	12	13	26	17	12	244	3,05
7	Information usefulness	9	5	24	30	12	271	3,39

3. Service Interaction Quality

Based on the WebQual 4.0 questionnaire results for the service interaction quality dimension, an overview of the quality of interactions and services experienced by users while accessing the Bina Darma University website was obtained. Overall, the evaluation indicated that the website's interaction and service quality falls into the fair category, with an overall mean score of 3.22.

The website provides a satisfactory basic interaction experience. Users rated the clarity of service information (3.33) and the professional impression of the website (3.36) as fairly good, which helps build trust in the institution.

The lowest score was for access stability without technical interruptions (2.54), indicating that some users still experience technical difficulties while accessing the website. This suggests that improvements in technical stability and consistency are necessary to enhance the overall interaction and service experience.

The respondents' scores for the service interaction quality dimension are presented in detail in the following table 10.

TABLE 10
SERVICE INTERACTION QUALITY DIMENSION EVALUATION RESULTS

No	Indicator	1	2	3	4	5	Total Score	Mean
1	Website access stability	24	14	25	9	8	203	2,54
2	Link functionality	9	10	28	19	14	259	3,24
3	Contact information clarity	9	9	18	28	16	273	3,41
4	Website professionalism and credibility	10	6	25	23	16	269	3,36
5	Academic and non-academic service information clarity	9	12	18	26	15	266	3,33
6	User trust in service commitment	6	12	18	28	16	276	3,45
7	Overall user satisfaction	10	12	22	24	12	256	3,20

In general, the Bina Darma University website is easy to use, provides fairly accurate information in clear language,

and offers adequate basic interaction. However, there is room for improvement in several aspects, including visual design and reading comfort, effectiveness of inter-page navigation, page loading speed, information layout and content update consistency, as well as access stability and technical consistency. Enhancing these aspects is expected to improve user comfort, satisfaction, and trust in the website.

C. Evaluation Results Using Google Lighthouse

Google Lighthouse testing was conducted to evaluate the technical performance of the Bina Darma University website across four main aspects: Performance, Accessibility, Best Practices, and SEO. The evaluation focused on the main pages of the website, namely the Home, News, Scholarship, and Registration pages, to obtain an objective overview of page loading speed, accessibility levels, compliance with web development standards, and the website's readiness to support search engine visibility.

The results of the Google Lighthouse testing for the Home, News, Scholarship, and Registration pages are presented in detail in the following table 11.

TABLE 11
GOOGLE LIGHTHOUSE EVALUATION RESULTS

Page	Performance	Accessibility	Best Practices	SEO
Home	72	76	73	92
News	51	79	96	83
Scholarship	72	68	73	85
Registration	63	73	73	92

1. Performance

The performance aspect in Google Lighthouse testing was used to assess the speed and efficiency of the website in loading pages, including initial load time and resource management. The results showed that the Home and Scholarship pages had the highest scores (72), while the News page had the lowest score (51). The low score was influenced by large page file sizes, unoptimized images, and slow server response, which reduced user comfort.

2. Accessibility

The accessibility aspect in Google Lighthouse was used to evaluate the extent to which the website can be accessed and used by various groups of users, including those with specific limitations. The results indicated that the News page had the highest score (79), while the Scholarship page had the lowest score (68). Factors contributing to the lower scores included inconsistent page element structures, insufficient accessibility attributes, and suboptimal visual layout.

3. Best Practice

The best practices aspect in Google Lighthouse testing was used to assess the website's compliance with good and secure web development standards. The results showed that the News page achieved the highest score (96), while the other pages scored 73. The high scores were influenced by the use

of HTTPS, basic security measures, modern web technologies, and minimal JavaScript errors.

4. Search Engine Optimization

The search engine optimization (SEO) aspect in Google Lighthouse was used to evaluate the website's readiness to support visibility on search engines. The results indicated that the Home and Registration pages had the highest scores (92), while the News page had the lowest score (83). High scores were influenced by proper heading structures, meta descriptions, image alt tags, internal links, and URL optimization. Pages with lower scores require improvements in structure and optimization of SEO elements.

D. Correlation Between User Perceptions and Technical Results

The correlation analysis between user perceptions measured using WebQual 4.0 and the technical evaluation results from Google Lighthouse revealed a clear relationship between users' subjective experiences and the technical condition of the Bina Darma University website.

Based on the WebQual results, the usability dimension, which includes ease of use, navigation, and access speed, showed a pattern consistent with the performance scores from Lighthouse. The News page, which had the lowest performance score (51), also received lower usability ratings, particularly in terms of page loading speed and smooth navigation. Conversely, the Home and Scholarship pages, which had higher performance scores (72), were perceived as more usable by users. These findings confirm that the website's technical performance directly affects user comfort in accessing and navigating pages.

The accessibility aspect from Lighthouse also correlated with the service interaction quality dimension in WebQual. Pages with lower accessibility scores, such as the Scholarship page (68), corresponded with user ratings indicating less stable service interaction, whereas the News page (79) showed better consistency between user perception and technical conditions. This suggests that access stability and content readability directly influence users' interaction experience.

The information quality dimension in WebQual aligned with the SEO scores from Lighthouse. All pages had relatively high SEO scores (83–92), supporting users' ease of finding information through search engines. However, aspects such as content updates and information layout still need attention to ensure that information quality remains relevant, consistent, and supportive of user perception.

These findings are consistent with previous studies, which indicated that usability, information quality, and service interaction quality significantly contribute to user satisfaction with university websites [20]. This underscores the consistent importance of the three WebQual dimensions in shaping user experience. This study complements those findings by incorporating technical evaluation using Google Lighthouse to assess the website's performance more objectively.

Overall, the analysis shows that technical quality and user experience are closely interrelated and cannot be separated. The gaps identified, particularly in page loading speed and accessibility consistency, highlight key areas for improvement. These results emphasize the need for an integrated approach in website development, focusing on optimizing system performance to ensure a more optimal and stable user experience.

E. Research Limitations

This study has several limitations that should be considered:

a. Respondent Scope

The study involved only 80 respondents who are users of the Bina Darma University website. Although this number is sufficient for an exploratory study, the characteristics of other users outside this sample are not fully represented.

b. Google Lighthouse Technical Testing

The evaluation using Google Lighthouse was conducted only on the main pages at a specific time. Factors such as network conditions, different devices, or browser variations may affect the technical scores.

c. Time and Resource Constraints

The testing covered only a single data collection period. Any content changes or website optimizations after this period were not recorded.

d. Focus of the WebQual Instrument

The WebQual 4.0 analysis measures three main dimensions, but does not assess additional specific factors such as detailed visual design, interactive multimedia content, or integration with external services.

e. Generalizability of Findings

The findings of this study apply specifically to the Bina Darma University website. Comparisons with other university websites are used only as literature references, so the results cannot be directly generalized to all higher education institutions.

F. Website Improvement Recommendations

Based on the results from WebQual 4.0 and Google Lighthouse, improvements to the Bina Darma University website should focus on aspects that received lower scores to enhance user experience. For performance, the lowest score was found on the News page, indicating slow loading times due to large image sizes, CSS and JavaScript that hinder rendering, and high Cumulative Layout Shift (CLS) values. Recommended technical measures include image compression and optimization, using modern formats such as WebP, minifying and combining CSS/JavaScript files, and deferring non-essential scripts to speed up First Contentful Paint (FCP) and Largest Contentful Paint (LCP).

Regarding best practices, the score differences between pages indicate that some still contain insecure resources (HTTP), suboptimal third-party scripts, and console errors. Specific recommendations include consistent implementation

of HTTPS, evaluation and selection of third-party scripts, and regular code audits to ensure that content updates or new features adhere to safe and clean development standards.

In the accessibility aspect, the lowest score was on the Scholarship page, influenced by inconsistent heading structures, insufficient color contrast, missing alt text for images, and unclear labeling of interactive elements. Recommended improvements include establishing a hierarchical and consistent heading structure, enhancing color contrast according to accessibility standards, adding descriptive alt text for all images, and clarifying the names of interactive elements to make the website more accessible, including for screen reader users.

For SEO, although the scores were relatively high, some pages still lacked meta descriptions, had non-descriptive link text, and had suboptimal heading structures. Technical solutions include ensuring consistent metadata, improving link text to be informative, organizing headings systematically, and enhancing page performance to increase the website's search engine visibility and support users in finding information efficiently.

With integrated and specific improvements like these, it is expected that enhancing the website's technical quality will directly improve user perception, ease of use, and trust in the website as the official university platform.

IV. CONCLUSION

Based on the evaluation using WebQual 4.0 and technical testing with Google Lighthouse, the overall quality of the Bina Darma University website is generally in the fair to good category. The WebQual results indicate that the information quality dimension received the highest average score of 3.42 (good), showing that the website's information is perceived as relevant, clear, and easy to understand by users. Meanwhile, the usability dimension scored an average of 3.04 and service interaction quality 3.22 (fair), indicating that aspects such as ease of use, access speed, and service stability still require improvement.

From a technical perspective, Google Lighthouse testing showed that the performance scores ranged from 51 to 72 and accessibility from 68 to 79, suggesting that these aspects need further enhancement. On the other hand, best practices and SEO scored relatively well, ranging from 73 to 96 and 83 to 92, respectively. These findings highlight the importance of improving page loading speed, optimizing website resource management, ensuring consistent content updates, and implementing accessibility standards to provide a more optimal user experience. The results of this study are expected to serve as a reference for website administrators in enhancing the quality of information services and the overall accessibility and comfort for users.

REFERENCES

- [1] E. Rahmi, E. Yumami, and N. Hidayasari, "Analisis Metode Pengembangan Sistem Informasi Berbasis Website: Systematic Literature Review," *Remik: Riset dan E-Jurnal Manajemen Informatika Komputer*, pp. 821–834, 2023.
- [2] Y. Z. Surentu, D. M. Warouw, and M. Rembang, "Pentingnya website sebagai media informasi destinasi wisata di dinas kebudayaan dan pariwisata kabupaten minahasa," *Acta Diurna Komunikasi*, 2020.
- [3] B. Apriliyanto, I. M. Pradnyana, and G. A. Saskara, "Pengujian Website Program Studi Sistem Informasi Universitas Pendidikan Ganesha Menggunakan Metode McCall Software Quality," *Jurnal Janitra Informatika dan Sistem Informasi*, vol. 5, no. 1, pp. 14–23, 2025.
- [4] M. Priscillia, H. Budiono, H. Wiyanto, and H. Widjaya, "The Effects of Website Design Quality and Service Quality on Repurchase Intention Among Shopee Customers in Jakarta, with Customer Trust as a Mediating Variable," *Proceedings Of The Ninth International Conference On Entrepreneurship And Business Management (ICEBM 2020)*, vol. 178, no. 1, pp. 38–44, 2021.
- [5] K. Roz, "Analysis of the Effect of Website Quality on User Satisfaction using the WebQual 4.0 Method," *Journal of Management and Entrepreneurship*, vol. 8, no. 1, pp. 41–4, 2020.
- [6] H. N. K. Giao, B. N. Vuong, and T. N. Quan, "The influence of website quality on consumer's e-loyalty through the mediating role of e-trust and e-satisfaction: An evidence from online shopping in Vietnam," *Uncertain Supply Chain Management*, pp. 351–370, 2020, doi: 10.5267/j.uscm.2019.11.004.
- [7] M. Rosario B, M. Istoningtyas, and F. Febrianti, "Analisis Kualitas Website Samsat Jambi Menggunakan Metode Delone And Mclean," *Rabit: Jurnal Teknologi dan Sistem Informasi Univrab*, vol. 6, no. 2, pp. 138–144, Jul. 2021, doi: 10.36341/rabit.v6i2.1743.
- [8] M. Reza Maulana, E. Budi Susanto, and S. Satriedi, "Analisis Kinerja Website Pemerintah Kota Pekalongan," *Jurnal Litbang Kota Pekalongan*, vol. 20, Jun. 2021, doi: 10.54911/litbang.v20i.144.
- [9] M. Nurendra, H. M. Az-Zahra, and I. Aknuranda, "Evaluasi Aksesibilitas Portal Akademik dan Pembelajaran Fakultas Ilmu Komputer Universitas Brawijaya berdasarkan Web Content Accessibility Guidelines (WCAG)," *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, vol. 6, no. 10, pp. 5056–5063, 2022.
- [10] D. Danendra, N. Oktadini, P. E. Sevtiyuni, A. Meiriza, and P. Putra, "Analisis User Experience Pada Website Dicoding Menggunakan Metode User Experience Questionnaire (UEQ)," *The Indonesian Journal of Computer Science*, pp. 12–5, 2023.
- [11] I. Purwandani and N. O. Syamsiah, "Analisis Kualitas Website Menggunakan Metode Webqual 4.0 Studi Kasus: MyBest E-learning System UBSI," *JUSTIN (Jurnal Sistem dan Teknologi Informasi)*, pp. 300–306, 2021.
- [12] K. R. Prasianto and K. D. Hartomo, "Pengujian Sistem Informasi Pelayanan Desa Terhadap Kepuasan Pengguna Menggunakan Metode Webqual 4.0," *Jurnal Media Informatika Budidarma*, 2022.
- [13] Oktamia Anggraini Putri, "Jurnal Pendidikan dan Konselling," *Jurnal Pendidikan dan Konseling*, vol. 4, no. 20, pp. 1349–1358, 2022.
- [14] M. Salim, L. Alfansi, S. Anggarawati, F. E. Saputra, and C. Afandy, "The role of perceived usefulness in moderating the relationship between the delone and mclean model and user satisfaction," *Uncertain Supply Chain Management*, vol. 9, no. 3, pp. 755–766, 2021.
- [15] S. O. Ighomereho, A. A. Ojo, S. O. Omoyele, and S. O. Olabode, "From Service Quality to E-Service Quality: Measurement, Dimensions and Model," Apr. 2022.
- [16] M. Afriansyah, V. Y. P. Ardhana, and J. Saputra, "Pengukuran Kualitas Website Universitas Qamarul Huda Badaruddin Menggunakan Metode Webqual 4.0," *SainsTech Innovation Journal*, vol. 5, no. 1, pp. 175–182, 2022.
- [17] C. Pratama, N. R. Dzakiyullah, A. Ratnasari, and A. A. Harahap, "Analisis Kualitas Website Universitas Alma Ata Menggunakan Pendekatan WebQual 4.0," *J. Tekno Kompak*, vol. 19, no. 1, pp. 121–133, 2025.
- [18] I. Habiba and G. Wijaya, "Pengukuran Kualitas Website Skill Academy Terhadap Kepuasan Pengguna Menggunakan Metode Webqual 4.0," *Paradigma-Jurnal Komputer Dan Informatika*, vol. 24, no. 1, pp. 29–36, 2022.
- [19] R. D. Prasetya, F. M. Khairy, N. Hibban, D. B. Rifa'i, and R. I. Pasya, "Pengujian Usability Pada Website Kitabisa. Com Menggunakan Metode System Usability Scale (Sus)," *METHODIKA: Jurnal Teknik Informatika dan Sistem Informasi*, pp. 26–29, 2023.
- [20] B. V Sopaheluwakan, D. Ridwandono, and A. Wulansari, "Analisis Kualitas Website Universitas Negeri Semarang Menggunakan Model Webqual 4.0," *JATI (Jurnal Mahasiswa Teknik Informatika)*, vol. 8, no. 4, pp. 5607–5614, 2024.