Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 6, Number 2, April 2022
DOI : https://doi.org/10.33395/sinkron.v7i2.11404
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Evaluation of Labuhanbatu Regency Government Website based on Performance Variables

Indah Armaini[1)*], Muhammad Halmi Dar[2)], Budianto Bangun[3)]
[1)2)3)]Universitas Labuhanbatu, Indonesia
[1)]ndharmaini@gmail.com, [2)] mhd.halmidar@gmail.com, [3)]budiantobangun44@gmail.com

Submitted : Apr 23, 2022 | **Accepted** : May 13, 2022 | **Published** : May 13, 2022

Abstract:. Since the Labuhanbatu Regency Government website was formed, there has been no attempt to evaluate its performance. This is important considering that the Labuhanbatu Regency Government website is a medium of public information needed by the community. The website is also an indicator of the government's quality assessment as an effort to improve services to the community. This study aims to analyze the website of the Labuhanbatu Regency Government using the evaluation method. The evaluation process is carried out with the help of the GTmetrix measuring tool by measuring website performance through performance metrics such as: First Contentful Paint (FCP), Speed Index (SI), Large Contentful Paint (LCP), Time to Interactive (TTI), Total Blocking Time (TBT), and Cumulative Layout Shift (CLS). The test results show that the Grade of the website is at level D, with 61% Performance, and 78% Structure. The test results on performance metrics on two tests show a downward trend, where the best FCP is achieved within 2100 milliseconds, SI 6500 milliseconds, LCP 4300 milliseconds, TTI 2100 milliseconds, and TBT 0 milliseconds, although the FCP, SI, and LCP metrics are still within category is not recommended. From the results of the study, it can be concluded that the GTmetrix measuring instrument can be used to evaluate the performance of the Labuhanbatu Regency Government website with automated testing techniques. The evaluation results obtained are, the website manager of the Labuhanbatu Regency Government must audit the "Reduce initial server response time" aspect which is still relatively slow. This means that the website manager of the Labuhanbatu Regency Government must reduce the initial server response time of the website. From the results of this study, several recommendations can be given, namely: Optimizing program code and database queries, Implementing caching on the server or implementing Content Delivery Network (CDN) technology, Upgrading Server hardware, CPU, and Memory.

Keywords: Evaluation; GTmetrix; Labuhanbatu; Performance; Recommendation; Website.

INTRODUCTION

Website is a resource that provides data and information that can be accessed by everyone via the internet. Websites have an important role for organizations and companies in providing information services (Santari & Rahayuda, 2018). Even for the government, the website is a medium for distributing information to the public as one of the e-Government tools (Warjiyono & Hellyana, 2018). Where, the first stage in the development of e-Government is the presence of websites in government agencies (Wicaksono & Susanto, 2013). Apart from being a medium of information, the website is an indicator of quality assessment of government organizations (Yulianto & Ismail, 2021) as an effort to improve government services to the community (Purbokusumo, Tsai, Sulisdana, Chen, & Santoso, 2021).

Presidential Regulation (PERPRES) of the Republic of Indonesia Number 95 of 2018 concerning an Electronic-Based Government System instructs every Regional Government at the provincial or district level to have a public service portal in the form of a web channel that can be accessed by all levels of society (Indonesia, 2018). In order to follow up the PERPRES, the Regent of Labuhanbatu issued a regulation regarding Guidelines for the Implementation of e-Government in the Labuhanbatu Regency Government (Pemkab) where one of the

*name of corresponding author

important points is the development of a website which is managed directly by the Communication and Information Office of Labuhanbatu Regency (Labuhanbatu, 2018). Therefore, since 2018, the Labuhanbatu Regency Government has had a website (https://labuhanbatukab.go.id/) which is integrated with a number of e-Government applications, and has several sub-domains that are directly connected to each Regional Apparatus Organization. in Labuhanbatu Regency. The Labuhanbatu Regency Government website is a very vital public information media channel and is needed by the community. Website development is carried out to improve the performance of the electronic-based government system in Labuhanbatu Regency.

An important evaluation is carried out to see the quality of the website in providing information services (Juliane, Dzulkarnaen, & Susanti, 2019). Evaluation is very necessary to see what indicators can affect the quality of a website (Pamungkas & Saifullah, 2019).

This study aims to evaluate the performance of the Labuhanbatu Regency Government website. The selection of performance variables is carried out to measure the level of responsiveness of a website in loading pages (Król, 2018). In addition, performance variables can also measure the level of accuracy and resilience of a website during different workloads (Tutul Hossain, Hassan, Amjad, & Rahman, 2021). In evaluating the performance variables of the Labuhanbatu Regency Government website, the GTmetrix measuring instrument is used. As for the formulation of the problem in this study, whether the GTmetrix measuring instrument can evaluate the performance of the Labuhanbatu Regency Government website, what evaluation results are obtained, and what are the results of the recommendations given. Hopefully, the results of this study can be used as recommendations for better management of the Labuhanbatu Regency Government website.

LITERATURE REVIEW

The performance aspect is one of the variables of the PIECES method (Adiguna, Saputra, & Pradana, 2018). Performance variables will provide recommendations on whether a website needs to improve its performance and how fast it takes to respond to requests (Ula, Tjut Adek, & Bustami, 2021). Performance testing is carried out to evaluate the website so that it becomes better (N. Kumar, Kumar, & Rajak, 2021). There are many ways that can be used to test the performance of a website. One of them is to use measuring tools that can provide detailed details about the resources and components that exist on the website (Fryonanda & Ahmad, 2017). In testing the performance of a website, choosing the right measuring tool is an important thing that must be considered.

There are several measuring tools that can be used to measure the performance of a website, including: Dotcom-Monitor, Geekflare, GTmetrix, Site Relic, and WebPageTest, each of which has advantages and disadvantages (C. Kumar, 2022). GTmetrix is a tool that can be used to test the performance of a website based on aspects: response time, the amount of bandwidth used, and the size of the page (Ismail et al., 2021). GTmetrix provides a number of recommendations on how to easily optimize the performance of a website (GTmetrix, 2022). The test results from GTmetrix will be displayed in the form of grades which are represented qualitatively with the letters A, B, C, D, E and F, while the scores are displayed quantitatively in the form of numbers (Dawis & Setiawan, 2022). The higher the grade and score generated by GTmetrix, the faster the website will load (Masyhur, 2014).

Several previous studies have proven that GTmetrix can be used as a measuring tool to test the performance of a website. GTmetrix features a complete report on the performance aspects of a website (Jun, Xiang, Ismail, Goy, & Yi, 2021) (Listartha, 2020). Previous research (Dawis & Setiawan, 2022) has implemented GTmetrix as a tool in website performance trials with detailed results and provides optimization recommendations for a website (Silalahi et al., 2021). GTmetrix also makes it very easy for users to do testing because it has a user-friendly graphical interface, performance testing can be done with different browsers, and GTmetrix is free (Manuaba, 2021). Likewise, what is done by comparing two websites, the results from GTmetrix provide accurate information about the performance level and loading time of the website (Suliman, 2020).

METHOD

This study uses an evaluation method (Ula et al., 2021). Data collection was carried out using observation techniques (Suliman, 2020) (Masyhur, 2014) by observing accompanied by recording the object under study. Details of the stages of this research, are shown in the research framework Figure 1.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 6, Number 2, April 2022
DOI : https://doi.org/10.33395/sinkron.v7i2.11404
e-ISSN : 2541-2019
p-ISSN : 2541-044X

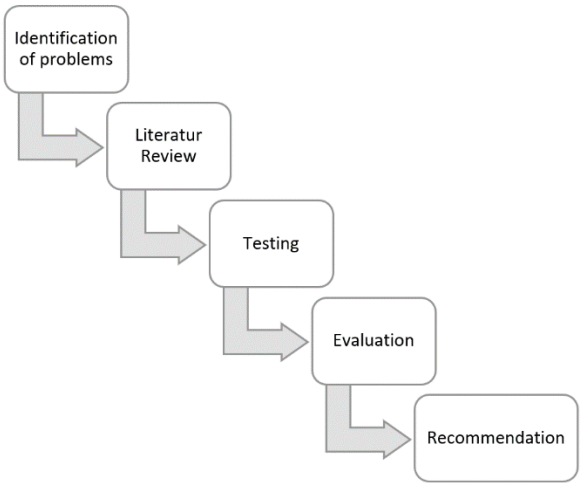


Fig 1. Research Framework

Identification of problems

The problem identification process is carried out using an observation technique (Suliman, 2020) (Masyhur, 2014), by observing and recording the object under study. In this case, the object under study is the website of the Labuhanbatu Regency Government which is located at https://labuhanbatukab.go.id/.

Literatur Review

Then proceed with reading literature from several previous studies which are closely related to the topic of web performance analysis and evaluation and the application of GTmetrix tools.

Testing

At this stage, testing was carried out on the Labuhanbatu Regency Government website using the GTmetrix measuring instrument automatically (Dawis & Setiawan, 2022) by entering the web url under test to the https://gtmetrix.com/ page. Before testing, it is necessary to determine what instruments are needed in the test environment. For more details, see Table 1 below.

Table 1. Testing Instruments

Elements	**Descriptions**
Time	• First test: July 29, 2021 • Second test: April 18, 2022
Platform	Desktop
Server test location	Vancouver Canada
Connection	• First test: Download speed 10.8 Mbps, Upload speed 11.2 Mbps. • Second test: Download speed 10.3 Mbps, Upload speed 10.56 Mbps
Performance metrics	First Contenful Paint, Speed Index, Large Contenful Paint, Time to Interactive, Total Blocking Time, and Cumulative Layout Shift (et al., 2021)
Workstation	Intel Core i3-1005G1 CPU @1.20GHz; SSD 256 GB; RAM 4 GB

Evaluation

At this stage, a descriptive analysis was carried out on the test results data. As shown in Table 1, this test was carried out at two different times. Then, the results of the two tests will be evaluated. Then, conclusions can be drawn that can be used as recommendations.

Recommendation

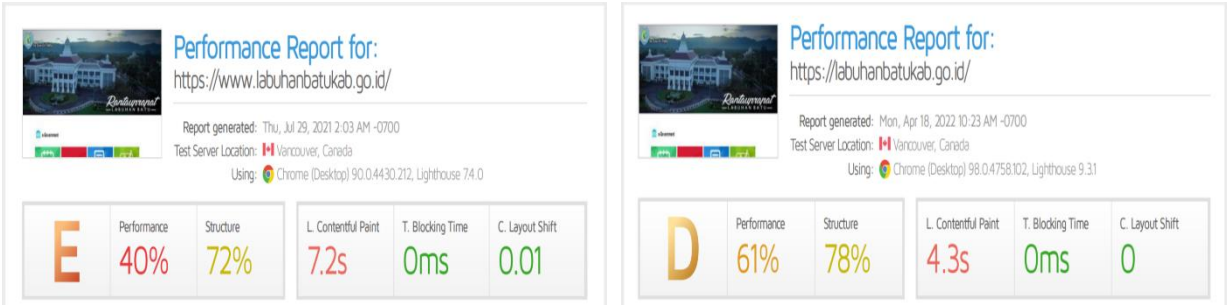
The results of the evaluation of the test data will become recommendations and suggestions for improving the Labuhanbatu Regency website for a better direction.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 6, Number 2, April 2022
DOI : https://doi.org/10.33395/sinkron.v7i2.11404
e-ISSN : 2541-2019
p-ISSN : 2541-044X

RESULT

Based on the results of testing on the Labuhanbatu Regency Government website conducted in July 2021 and April 2022, the GTmetrix measurement results are shown in Figure 2 below.



(a) (b)

Fig 2. GTmetrix measurements

Figure 2(a) is the result of the first test of GTmetrix on the website of the Labuhanbatu Regency Government which was carried out on July 21, 2021. Figure 2(b) is the result of the second test of GTmetrix on the website of the Labuhanbatu Regency Government which was conducted on April 18, 2022. In addition to the different testing times, the versions of Browser and Lighthouse used during testing are also different. In the first test, using Chrome Browser version 90.0.4430212 and Lighthouse v7.4.0. While in the second test, using the Chrome browser version 98.0.4758.102 and Lighthouse v9.3.1. Furthermore, the test results are presented in Table 2 for comparison.

Figure 2 shows the results of GTmetrix measurements on the Labuhanbatu Regency Government website based on three variables, namely, Grade, Performance, and Structure. The grade variable in GTmetrix indicates the quality of website performance in terms of page loading, interactivity, and visual stability. The grade in the first test is at level E, while in the second test it is at level D. The performance variable shows how well the Labuhanbatu Regency Government website is from the user's perspective. In the first test, the performance score was obtained with a percentage of 40%. Meanwhile, in the second test, a performance score of 61% was obtained. The structure variable reflects how well a website is developed for optimal performance. In the first test, the structure score obtained was 72%. While in the second test, the structure score was 78%.

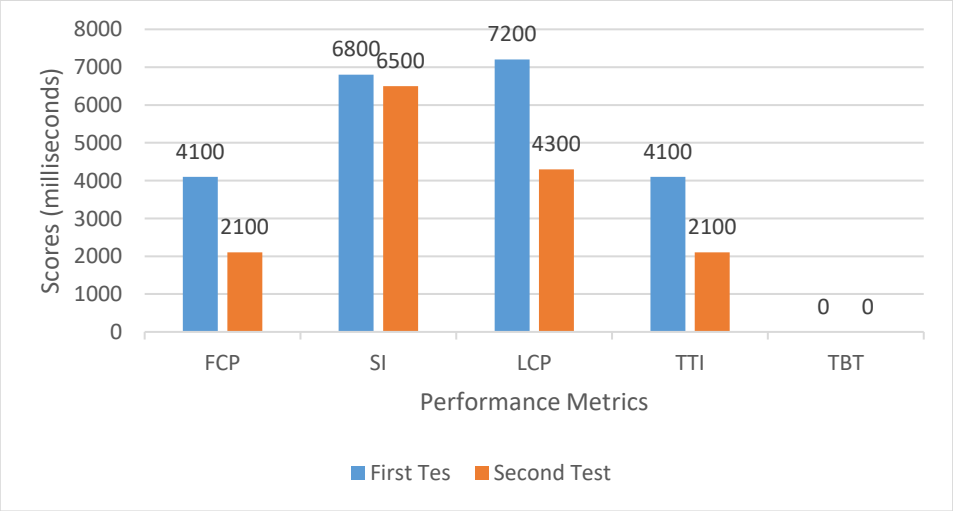


Fig 3. Website Performance Metrics Test Results

Figure 3 shows in detail the test results of the performance of the Labuhanbatu Regency Government website metrics which are shown quantitatively based on time (milliseconds). First Contentful Paint (FCP) measures the performance of how quickly visitors can view website content; in the first test it takes 4100 milliseconds to view the website content of the Labuhanbatu Regency government, while in the second test it only takes 2100 milliseconds. Speed Index (SI) measures the performance of how fast web page content loads; the first test takes 6800 milliseconds, while the second test only takes 6500 seconds. Largest Contentul Paint (LCP) measures how

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 6, Number 2, April 2022
DOI : https://doi.org/10.33395/sinkron.v7i2.11404
e-ISSN : 2541-2019
p-ISSN : 2541-044X

long it takes to load the largest content from a website; in the first test it takes 7200 milliseconds, while in the second test it takes 4300 seconds. Time to Interactive (TTI) measures the responsiveness of the website when the website loads the page; the first test took a response time of 4100 milliseconds, while the second test took only a response time of 2100 milliseconds. Total Blocking Time (TBT) measures how much time was blocked during page load; on the first and second tests showed results 0 milliseconds.

There is one more performance metric that resulted from the GTmetrix test, namely, the Cumulative Layout Shift (CLS) performance metric. CLS performance metrics measure how much the page layout shifts when the website loads. Testing the CLS performance metrics on the Labuhanbatu Regency Government website shows the bottom result in the first test the resulting value is 0.01, while in the second test the result is 0.

In addition to displaying website performance test results data. GTmetrix also provides a number of recommendations for improving website performance. The results of the recommendations are shown in table 2 below.

Table 2. Website Performance Improvement Recommendations

	Audit	**Impact**	**Descriptions**
First Test	1. Eliminate render-blocking resources	High	Potential savings of 7.8s
	2. Reduce initial server response time	High	Root document took 878ms
	3. Avoid chaining critical requests	Medium	35 chains found
	4. Use a Content Delivery Network (CDN)	Medium	71 resources found
	5. Use HTTP/2 for all resources	Medium	Potential savings of 15.0s
Second Test	Reduce initial server response time	High	Root document took 1.1s
	Avoid enormous network payloads	Med-High	Total size was 4.46MB
	Serve static assets with an efficient cache policy	Medium	Potential savings of 2.84MB
	Efficiently encode images	Med-Low	Potential savings of 1.20MB
	Eliminate render-blocking resources	Low	Potential savings of 115ms

Table 2 presents GTmetrix recommendations for improving the performance of the Labuhanbatu Regency Government website. The Audit column shows what problems need to be fixed. The Impact column is the impact of problems based on a priority scale (Low to High) which is represented by color. That is, the more problematic the impact will be high, whereas if the problem is small then the impact will be low.

First test recommendations: (1) GTmetrix recommends removing resources that block the rendering process that makes website page load slow, removing these resources will potentially save 7.8 seconds. (2) GTmetrix recommends reducing the initial server response time because it will affect the time it takes to load website pages. The audit arose because the time it took to load the document root was 878ms. (3) GTmetrix recommends avoiding critical query chains as they have a very negative impact on web page loading performance. The test found 35 critical demand chains. (4) GTmetric recommends using a Content Delivery Network (CDN) which is useful for reducing website latency. The test results found 71 content sources. (5) Use HTTP/2 for all resources. (5) GTmetric recommends the use of HTTP/2 protocol which impacts web speed by 15.0 seconds reduction.

Second test recommendation: (1) GTmetrix still recommends reducing the initial server response time. In this test, there was an increase in the time to load the root document on the website compared to the first test to 1.1 seconds. (2) GTmetrix recommends avoiding the process of loading large network/file sizes. The test shows a number of 4.46MB on the total page size of the Labuhanbatu Regency Government website. (3) GTmetrix recommends using static assets with efficient use of cache on the website because it has the potential to save 2.84MB of files. (4) GTmetrix recommends encoding images efficiently by reducing the image file size to speed up the downloading of images. (5) GTmetrix still recommends removing resources that block rendering, but in the second test, the impact has changed to Low.

DISCUSSIONS

This study has shown different results from the two test times. From these results, there have been significant changes in the performance of the Labuhanbatu Regency Government website. In the Grade, Performance, and Structure variables shown in Figure 2 there is an increase. Grade that was originally E has now become D.

*name of corresponding author

Performance which was originally 40%, has increased to 61%. Likewise with the Structure website, there was an increase from 72% to 78%.

In addition, there has also been a change in the scores for the performance metrics shown in Figure 3. FCP, which originally took 4100 milliseconds, has now decreased to 2100 milliseconds although according to GTmetrix it is still in the “Much longer than recommended” category. The SI metric also experienced a small decrease, which was 300 milliseconds in the “Much longer than recommended” category. LCP experienced a significant decrease of 2900 milliseconds, and was still in the unsatisfactory “Much longer than recommended” category. In the TTI metric there has been a very significant decrease of 2000 milliseconds which makes the performance on this metric better in the "Good" category. Likewise with TBT, is in the "Good" category.

While the recommendations generated by GTmetrix (Table 2) in the first and second tests will be compared. In the first test, there are audit results with High impact as much as 2, and Medium impact 3. While in the second test, there are very varied impact results, namely, High, Med-High, Medium, Medium-Low, and Low. From the two test results, there has been a very significant change in the problem of "Eliminate rendering-blocking resources", where in the first test the impact was high, now it has decreased to low. However, the “Reduce initial server response time” problem still doesn't change anything, it's still at a high level. From the two tests, what GTmetrix highly recommends for the Labuhanbatu Regency Government website for repairs is the "Reduce initial server response time" problem..

Regarding the difference in results between the first and second tests, it is not yet known what the real causal factor is. Is it because of the different versions of the Browser and Lighthouse used or maybe there has been an improvement from the Labuhanbatu Regency Government website manager?.

This research is still relatively simple, because it only compares two test times by limiting one performance measurement tool. In the future, it is necessary to conduct more comprehensive research using more web performance measuring tools such as: Pingdom, Webpage Test, PageSpeed Insight, etc., so that measurements of the performance of a website can be compared from the results of each measuring tool. Or it is necessary to add another variable, namely, the web security variable.

CONCLUSION

In this study, an evaluation of the Labuhanbatu Regency Government website has been carried out using the GTmetrix measuring instrument with two different testing times. From the results of this study, it can be concluded that the GTmetrix measuring instrument can be used to evaluate the performance of the Labuhanbatu Regency Government website with automatic testing techniques by entering the URL address of the Labuhanbatu Regency Government website through the GTmetrix official page. From the test results obtained results that include performance grade, structure, performance metrics, as well as recommendations for improving the website of the Labuhanbatu Regency Government.

The evaluation results obtained are, the website manager of the Labuhanbatu Regency Government must audit the "Reduce initial server response time" aspect which is still relatively slow. This means that the Labuhanbatu Regency Government website manager must reduce the initial server response time of the website. Reducing the initial response time of the server is very important because it affects every resource referenced in the HTML of the website, and can directly affect the time it takes on the web page. This can also negatively impact visitors who only see a blank page while the browser is waiting for a response from the server.

From the results of this study, several recommendations can be given as an optimization step from the evaluation results. The recommendations are: Optimizing program code and database queries, Implementing caching on the server or implementing Content Delivery Network (CDN) technology, Upgrading Server hardware, CPU, and Memory. Hopefully the results of this research can be useful for the management of the Labuhanbatu Regency Government website in a better direction, and can fill the void related to the literature related to evaluating the performance of the Government website, especially the Labuhanbatu Regency Government website.

REFERENCES

Adiguna, A. R., Saputra, M. C., & Pradana, F. (2018). Analisis dan Perancangan Sistem Informasi Manajemen Gudang pada PT Mitra Pinasthika Mulia Surabaya. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, *2*(2), 612–621.

Dawis, A. M., & Setiawan, I. (2022). Evaluation of The Website ‘Aisyiyah Surakarta of University Performance Based on Search Engine Optimization Using Automated Software Testing GTMetrix. *International Journal of Computer and Information System (IJCIS)*, *3*(1), 17–20. https://doi.org/10.29040/ijcis.v3i1.56

Fryonanda, H., & Ahmad, T. (2017). Analisis Website Perguruan Tinggi Berdasarkan Keinginan Search Engine Menggunakan Automated Software Testing GTmetrix. *KALBIScientia*, *4*(2), 179–183.

GTmetrix. (2022). GTmetrix Features. Retrieved April 8, 2022, from GTmetrix website:

*name of corresponding author

https://gtmetrix.com/features.html

Indonesia, P. R. Perpres Nomor 95 Tahun 2018 Tentang Sistem Pemerintahan Berbasis Elektronik. , Pub. L. No. Nomor 95, Kementerian Sekretariat Negara Republik Indonesia 110 (2018). Indonesia.

Ismail, N. A., Jamaluddin, F. I., Hamidan, A. H., Ali, A. F., Mohamed, S. E., & Said, C. S. (2021). Usability Evaluation of Encyclopedia Websites. *International Journal of Innovative Computing*, *11*(1), 21–25. https://doi.org/10.11113/ijic.v11n1.282

Juliane, C., Dzulkarnaen, R., & Susanti, W. (2019). Metode McCall's untuk Pengujian Kualitas Sistem Informasi Administrasi Tugas Akhir (SIATA). *Jurnal RESTI (Rekayasa Sistem Dan Teknologi Informasi)*, *3*(3), 488–495. https://doi.org/10.29207/resti.v3i3.1170

Jun, T. W., Xiang, L. Z., Ismail, N. A., Goy, W., & Yi, R. (2021). Usability Evaluation Of Social Media Websites. *Modernization in Engineering Technology and Science*, *03*(01), 216–221.

Król, K. (2018). Comparative Analysis of the Performance of Selected Raster Map Viewers. *Geomatics, Landmanagement and Landscape (GLL)*, *2*(2), 23–32. https://doi.org/10.15576/gll/2018.2.23

Kumar, C. (2022, April). How Fast Does Your Website Load on Mobile? Retrieved April 10, 2022, from geekflare website: https://geekflare.com/website-load-time-mobile/

Kumar, N., Kumar, S., & Rajak, R. (2021). Website Performance Analysis and Evaluation using Automated Tools. *2021 5th International Conference on Electrical, Electronics, Communication, Computer Technologies and Optimization Techniques (ICEECCOT)*, 210–214. https://doi.org/10.1109/ICEECCOT52851.2021.9707922

Labuhanbatu, B. (2018). Surat Edaran Kominfo. Retrieved April 10, 2022, from Pemkab Labuhanbatu website: https://labuhanbatukab.go.id/images/Surat_Edaran_Kominfo.pdf

Listartha, I. M. E. (2020). Pengujian Performa dan Tingkat Stress pada Website Legalisir Ijasah Online Universitas Pendidikan Ganesha. *Electro Luceat*, *6*(1), 66–73. https://doi.org/10.32531/jelekn.v6i1.182

Manuaba, I. B. K. (2021). Performance Comparison of Text Based Game Prototypes Using GTmetrix. *Journal of Games, Game Art, and Gamification*, *6*(1), 1–6. https://doi.org/10.21512/jggag.v6i1.7482

Masyhur, F. (2014). Kinerja Website Resmi Pemerintah Provinsi di Indonesia. *Jurnal Pekommas*, *17*(1), 9–14. Retrieved from https://jurnal.kominfo.go.id/index.php/pekommas/article/view/1170102

Pamungkas, R., & Saifullah. (2019). Evaluasi Kualitas Website Program Studi Sistem Informasi Universitas PGRI Madiun Menggunakan Webqual 4.0. *INTENSIF: Jurnal Ilmiah Penelitian Dan Penerapan Teknologi Sistem Informasi*, *3*(1), 22–31. https://doi.org/10.29407/intensif.v3i1.12137

Purbokusumo, Y., Tsai, W. H., Sulisdana, R., Chen, H. C., & Santoso, A. D. (2021). Website performance: evaluation in Ngawi District Government websites. *Electronic Government*, *17*(1), 105–127. https://doi.org/10.1504/EG.2021.112937

Silalahi, F. E. S., Prayitno, M., Gambetta, W., Amhar, F., Wijaya, M. N. Q. A., & Rachma, T. R. N. (2021). Identifikasi Pertumbuhan Data dan Penggunaan Application Performance Index (APDEX) Score dalam Penilaian Kinerja Aplikasi Penyaji Informasi Geospasial. *Jurnal Pekommas*, *6*(1), 95–104. https://doi.org/10.30818/jpkm.2021.2060110

Suliman. (2020). Analisis Performa Website Universitas Teuku Umar Dan Universitas Samudera Menggunakan Pingdom Tools Dan Gtmetrix. *SIMKOM*, *5*(1), 24–32. https://doi.org/10.51717/simkom.v5i1.47

Tutul Hossain, M., Hassan, R., Amjad, M., & Rahman, M. A. (2021). Web Performance Analysis: An Empirical Analysis of E-Commerce Sites in Bangladesh. *International Journal of Information Engineering and Electronic Business*, *13*(4), 47–54. https://doi.org/10.5815/ijieeb.2021.04.04

Ula, M., Tjut Adek, R., & Bustami, B. (2021). Emarketplace Performance Analysis Using PIECES Method. *International Journal of Engineering, Science & Information Technology (IJESTY)*, *1*(4), 1–6. https://doi.org/10.52088/ijesty.v1i4.138

*name of corresponding author