ISSN 2409-2665
Journal of Logistics, Informatics and Service Science
Vol. 10 (2023) No. 4, pp. 35-46
DOI:10.33168/JLISS.2023.0403

Measurement of Usability, Information Quality, Service Information Quality on News Portals Website using Important Performance Analysis

Muhammad Luthfi Hamzah [1], Alibek Yeskermessuly [2], Yesha Oktinadila[1], Nazaruddin [3], Astri Ayu Purwati[4]

[1]Department of Information System, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia
[2]Altynsarin Arkalyk pedagogical Institute, Kazakhstan
[3]Department of Industrial Engineering, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia
[4]Department of Management, Institut Bisnis dan Teknologi Pelita Indonesia, Indonesia

muhammad.luthfi@uin-suska.ac.id

Abstract. The News Portal serves as a platform for disseminating daily local news to the Indonesian population. To ensure the website's quality and effectiveness, it is crucial to evaluate its performance and user experience. The website faces several issues, such as an unappealing design, poor navigation, broken features, inaccurate information, and infrequent updates. In this study, we aim to assess the website's quality based on user satisfaction using the Webqual 4.0 approach, Importance Performance Analysis (IPA), and Customer Satisfaction Index (CSI). A total of 96 respondents participated in this study, selected using the Lemeshow formula. The analysis of conformity indicates that the overall average is 86%, falling below 100%. The gap analysis reveals a negative overall average of -0.54, indicating a misalignment between user expectations and the website's current performance. These results highlight the need for improvements to meet user requirements. The IPA quadrant analysis shows that attributes US3, US5, IQ1, IQ3, IQ4, and IQ5, with a CSI value of 67.61%, fall under the "Satisfied" category. However, despite the satisfactory service rating indicated by the CSI analysis, there is still room for improvement to achieve maximum user satisfaction, particularly in terms of Information Quality. In conclusion, this study demonstrates the importance of evaluating and enhancing the News Portal website's quality to meet user expectations. The findings highlight areas that require attention, specifically the aspect of Information Quality. By addressing these issues, the website can strive towards improved user satisfaction and provide a more effective platform for information dissemination.

Keywords: usability, information quality, service quality, news portal, important performance analysis

1. Introduction

Almost all of the information needs that people want today are done by searching the internet. Support and convenience in using the internet is one of the factors that many people currently use internet media in carrying out the search process (Sun et al., 2020; Szymkowiak et al., 2021; George, 2023). The easier it is to get this information, of course, every information manager must anticipate. People's lifestyle in accessing this information goes hand in hand with the ease of using the website (Novendra, 2020; Purwati et al., 2021). By using the website, people can easily search and compare various information available from various sources. With the increasing number of Indonesian people using the internet, the information needed by the community must also be provided on the internet, one of the media used for the process of conveying information to the public is using a website (Afriansyah et al., 2022; Novendra et al., 2022). Established a news portal website aimed at facilitating the public in finding daily news that discusses politics, topics, law, national, sports, automotive, potential, showcases, and opinions (Arias-Oliva et al., 2019; Bhat et al., 2023; Qadir et al., 2022; Salih et al., 2022).

As for the phenomena that exist on the news portal website are as follows: First, users are still dissatisfied with the unattractive appearance of the website, such as an empty space that is too long on the start page even though it does not contain any information. Meanwhile, according to (Qalati et al., 2021; Rabadán-Martín et al., 2019; Sudrajat et al., 2019), a quality and good-value website is not seen from just appearance but also user-friendly, uncomplicated and attractive (Pratiwi et al., 2022). The second problem is that it does not have a navigation feature to direct users to the next or previous page so that users have difficulty finding past news. This makes users can only see the latest news. As explained by (Chan et al., 2022; Choi et al., 2020; Li & Shang, 2020; Zhou et al., 2021), one of the key factors for website ser-vice quality is seen from its usability, how well it functions and how effectively users can navigate. These two problems include the usability dimension where the indicators have an attractive appearance and ease of navigation (Rerung et al., 2020; I. Sari et al., 2023; Syahidi et al., 2019).

The third problem is that the information presented is inaccurate, this can be seen from the news titles that are presented that do not match the images presented on the news page so that it makes users confused, while one of the conditions for an ideal website is to provide precise, accurate information. and actuality. The fourth problem is information that is not up-to-date, such as news in the opinion and potential categories that have not been updated for a long time, even though one of the requirements for an ideal website is to present up-to-date information (Ladan Haruna, B., & Madu, A. U., 2020; Tandoc et al., 2021).

The fifth problem is that there are features that don't work as they should, namely the search feature, this is evidenced when the user wants to search for the information needed but the website only displays a white screen. This makes it difficult for visitors to find the information they need, even though one of the conditions for an ideal website is to avoid broken links or pages that are still in the process of being created. And the sixth problem is that the language used is inconsistent, this can be seen from the difference in the language on the menu. According to (Asyhari et al., 2022; Tajudeen et al., 2022), explained the purpose of consistency, which includes matters such as writing, sentences, typefaces, and websites that must be easily understood and in accordance with the language of the user. Meanwhile, according to (Salih et al., 2022), websites must be designed in language that is easy to understand and consistent in writing (Budi et al., 2022; Ramadani et al., 2022; R. P. Sari & Henim, 2022).

The WebQual 4.0 method and Importance Performance Analysis (IPA) are utilized as techniques in analyzing the news portal website to address the issues that are now present. One of the most popular techniques in research to gauge a website's quality based on end users' perceptions is the Webqual 4.0 method. Webqual was first introduced by Barnes and Vigen in 1998 and has undergone several changes to each of its attributes. The Webqual 4.0 method is the latest version which has 22 questions and is categorized in 3 dimensions namely Usability, Information Quality, and Service Interaction Quality

(Andry et al., 2019; Hamzah et al., 2022; Syahputri et al., 2021; Utami et al., 2021).

Meanwhile, the IPA method is used as a tool to identify in more detail what indicators have not or have not fulfilled current user satisfaction. IPA was introduced for the first time by Martilla and James in 1977 with the aim of finding out how well the service providers are aware that the services provided have met the satisfaction of their users or not so that they can carry out further development by improving service quality which is also called Quadrant Analysis. IPA has been widely used in various scientific fields because it is easy to apply and simple in presentation, and can tell which attributes are a priority for improvement or reduction in order to maintain user satisfaction (Addas et al., 2021; Bi et al., 2019; Das & Basu, 2020; Esmailpour et al., 2020; Phadermrod et al., 2019).

Also, utilizing the Customer Satisfaction Index (CSI) assessment approach, this study will gauge how satisfied website visitors are with the overall functioning of the site. The outcome of this quantitative analytic method, which measures user happiness with a website, is a value expressed as a percentage (Nuraina et al., 2022; Yuliyanto et al., 2022). For service providers, determining how well a website has met customer expectations requires measuring user satisfaction (Budi et al., 2022; Kurniawan, 2022; Luthfi Hamzah et al., 2022; Purwati & Hamzah, 2022; Zulfahmi et al., 2022).

2. Methodology

The method to be used in this study is the WebQual 4.0, IPA and CSI methods. Distribution of questionnaires served as the method for gathering research data. The study questionnaire is based on the Webqual 4.0 method and has 22 questions that characterize three variables: usability, information quality, and service interaction quality. A Likert scale is the sort of instrument used in this study to assess the importance of interest and user satisfaction for the services offered by the website.

2.1. Population and Sample

Respondents in this study were Indonesian people who visited news portal websites from various backgrounds. In taking the sample using non-probability sampling technique, namely accidental sampling. Due to the precise population size in this study, the Lemeshow method was applied to simplify the calculation of the sample size, and the number of samples used in this study was 96.04 respondents, which was rounded up to 96 respondents.

2.2. Data Processing Stage

The steps taken at this stage are to analyze the results of the questionnaires that have been distributed and then to test the validity and reliability tests on the questionnaires. After collecting the results of all the questionnaire data that has been obtained, then from the answers of the respondents then do the initial data processing which includes the description of the respondents, this stage is carried out in order to find out the identity of each respondent. The identity of the respondents used in this study includes gender, age and occupation.

To determine if the questionnaire is practical to use or not, it is also necessary to examine its validity and reliability. As can be seen from the value of r count must be more than r table, the findings of the validity test can indicate whether or not a research questionnaire is valid. The reliability test is used to establish how much a measuring instrument can be trusted if it has passed multiple measurements yet still provides essentially the same results as long as the measurement characteristics remain constant. The reliability test was conducted using the 0.60 Cronbach's Alpha value as a foundation. IBM SPSS 25 validation and reliability testing.

2.3. Data Analysis

The activities carried out at this stage are analyzing data from questionnaires that have been distributed by conducting a suitability level analysis, gap level analysis, and IPA quadrant analysis of the data

obtained. and also perform CSI calculations to find out how much the overall level of user satisfaction is with the website. Assessment of user satisfaction is so important in determining how good a website is to find out whether the expectations of users have been fulfilled or not.

3. Result & Discussion

3.1 General Characteristics

This stage of the description of the characteristics of the respondents, data analysis was carried out based on the results of the answers of the respondents who were involved as many as 96 people. Respondents were taken from the general public who visited the news portal website. There are 3 identity characteristics of the respondents that will be used for gender, age and occupation. The following is an explanation of the identity characteristics of the respondents in the questionnaire.

Table 1. Respondent

Demography		Total	Percentage
Gender	Male	43	45%
	Female	53	55%
	Total	96	100%
Age	19-21	15	16%
	22-24	60	62%
	25-27	19	20%
	28-30	2	2%
	Total	96	100%
Occupation	Private employees	12	12%
	Entrepreneur	12	12%
	Government employees	2	3%
	Student	46	48%
	Others	24	25%
	Total	96	100

3.2 Validity and Reliability Test

A validity test is a test that determines how reliable, accurate, or valid a research instrument is. By comparing the value of r table with r count, where r count must be greater than r table, the validity test is conducted. The data is deemed legitimate and the survey is appropriate for further analysis if the value of r table is smaller than r count. In this investigation, 96 community respondents were identified with a 5% level of significance, yielding a r table value of (df = 96-2) = 94 of 0.2006. Thus, the instrument is deemed faulty if the r count or person correlation value is less than 0.2006. The Cronbach's Alpha method is also used to measure the reliability test; specifically, if the Cronbach's Alpha value is higher than 0.60, the reliability test findings are considered to be dependable.

Based on the calculations carried out, it is known that all statements in the questionnaire, both in terms of performance and expectations, have an r count value that is greater than r table (0.2006). This shows that all of these indicators are valid so that they can be used for further analysis. and so does the reliability test, it can be concluded that each instrument statement on the respondent's expectation questionnaire has Cronbach's Alpha > 0.60. This means that overall the questionnaire instrument used in this study was declared reliable and capable of further analysis.

3.3 Importance Performance Analysis Method

In this study there were 3 stages for data analysis, namely conformity level analysis, gap analysis and IPA quadrant analysis.

1. Conformity Level Analysis

Website performance scores and website expectation scores are compared using conformity level

analysis. If the website's performance meets user expectations. In this study, the general public is a visitor to a news portal website, it may be determined from the results of the analysis of the level of conformance. Table 2 shows the degree of compatibility between the news portal's performance and visitor expectations.

Table 2. Conformity Level Analysis

Dimensions	Code Statement	Performance Score	Expectation Score	Conformity Value (%)
Usability	U1	325	383	84,86%
	U2	333	369	90,24%
	U3	308	382	80,63%
	U4	338	372	90,86%
	U5	297	384	77,34%
	U6	329	372	88,44%
	U7	335	377	88,86%
	U8	338	379	89,18%
Information Quality	IQ1	319	383	83,29%
	IQ2	343	368	93,21%
	IQ3	300	384	78,13%
	IQ4	322	380	84,74%
	IQ5	315	392	80,36%
	IQ6	333	371	89,76%
	IQ7	326	364	89,56%
Service Interaction Quality	SIQ1	332	371	89,49%
	SIQ2	321	366	87,70%
	SIQ3	332	373	89,01%
	SIQ4	324	370	87,57%
	SIQ5	324	373	86,86%
	SIQ6	326	387	84,24%
	SIQ7	322	375	85,87%

Based on the results of the overall research indicators in the calculation of the suitability level, the percentage value is still below 100%. This shows that the quality of the website provided at this time still does not meet what is expected by users.

2. Gap Analysis

Gap level analysis is calculating the difference between the performance value and the user's expectation value. If the calculation results show a positive value, it means that the quality level of the website is said to be good, a positive result indicates that the performance meets what the user expects. However, on the contrary, if the value of the gap analysis is <0 or has a negative value, then the quality level of the website still does not meet the expectations of its users. The results of the gap analysis between performance and expectations can be observed in Table III.

Table 3. Gap Analysis

Dimensions	Code Statement	Performance Average	Expectation Average	Conformity Value (%)
Usability	U1	3,39	3,99	-0,60
	U2	3,47	3,84	-0,38
	U3	3,21	3,98	-0,77
	U4	3,52	3,88	-0,35
	U5	3,09	4,00	-0,91

	U6	3,43	3,88	-0,45
	U7	3,49	3,93	-0,44
	U8	3,52	3,95	-0,43
Information Quality	IQ1	3,32	3,99	-0,67
	IQ2	3,57	3,83	-0,26
	IQ3	3,13	4,00	-0,88
	IQ4	3,35	3,96	-0,60
	IQ5	3,28	4,08	-0,80
	IQ6	3,47	3,86	-0,40
	IQ7	3,40	3,79	-0,40
Service Interaction Quality	SIQ1	3,46	3,86	-0,41
	SIQ2	3,34	3,81	-0,47
	SIQ3	3,46	3,89	-0,43
	SIQ4	3,38	3,85	-0,48
	SIQ5	3,38	3,89	-0,51
	SIQ6	3,40	4,03	-0,64
	SIQ7	3,35	3,91	-0,55

In Table 3 it has been shown that the results of the gap level of the news portal website in all its attributes are negative, which means that the website has not met what users expect because there is a gap between performance and user expectations.

3. IPA Quadrant Analysis

In order to understand how users perceive the performance of a specific website, IPA quadrant analysis is used as a reference. It can map attributes according to how important they are to user satisfaction (Luthfi Hamzah et al., 2022). The results of the IPA analysis are represented graphically and are separated into four quadrants: I, which represents the main area for improvement, II, which represents maintaining achievement, III, which represents a low priority, and IV, which represents an excessive amount. Two intersecting lines perpendicular to the point (X, Y) separate these four quadrants. The average of the total average performance scores is represented on the X axis by dividing them by the total characteristics, while the average of the total average score expectations is represented on the Y axis by dividing them by the total attributes. Table IV shows how the coordinate points on the IPA diagram were determined based on average performance and typical responder expectations.

Table 4. IPA Diagram Coordinate Points

Dimensions	Performance	Importance
Average Total	74,40	86,20
Intersection (X,Y)	3,38	3,92

The X axis intersection point, which represents the overall average level of performance, has a value of 3.38, and the Y axis intersection point, which represents the overall average level of expectation, has a value of 3.92, according to the calculation of the IPA diagram's coordinates, which is displayed in Table IV. Additionally, the coordinate points on a Cartesian diagram will be displayed by the IBM SPSS Statistics Version 25 application. The IPA diagram used in this work was tested, and the findings are shown in Figure 1.

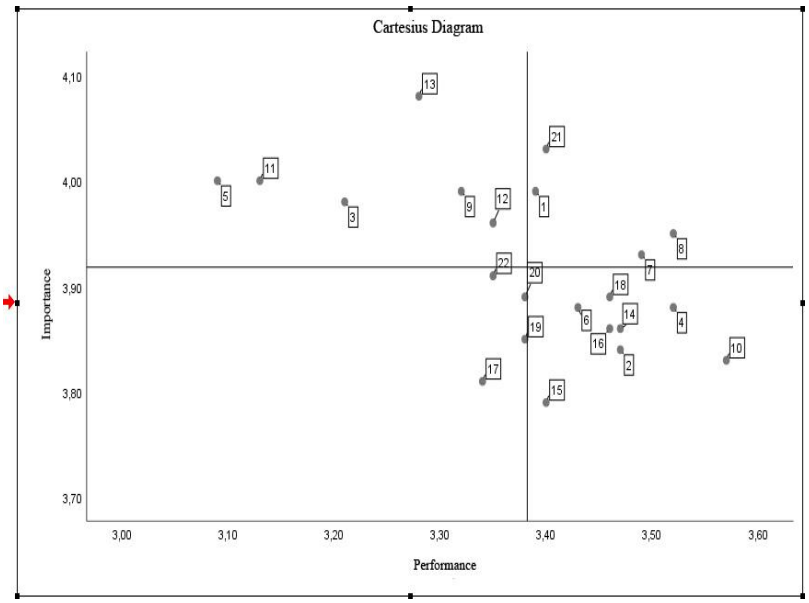

Fig. 1: IPA Diagram

The following is a description of the results of the IPA Quadrant in this study.

1. Quadrant I (High Importance/Low Performance): Concentrate These.

This quadrant demonstrates that even while users' satisfaction with these criteria is high, users' expectations are not always met by actual website performance. So that they may increase the website's quality and maximize visitor satisfaction, news portals should give careful consideration to the attributes in this quadrant as a high priority for future upgrades. This quadrant includes the following characteristics:

a. Attribute 3 = The news portal website is easy to navigate or has clear instructions (U3).
b. Attribute 5 = The news portal website has an attractive appearance (U5).
c. Attribute 9 = News portal website provides accurate information (IQ1).
d. Attribute 11 = News portal website provides up to date information (IQ3).
e. Attribute 12 = News portal website presents relevant information (IQ4).
f. Attribute 13 = News portal website presents information that is easy to understand (IQ5).

2. Quadrant II (High Importance/High Performance): Keep Up The Good Work.

According to this quadrant, the qualities in this quadrant are regarded as satisfactory or match visitor expectations, so it's critical to uphold quality. The quadrant contains 4 qualities, namely:

a. Attribute 1 = The News portal website is easy to learn to operate (U1).
b. Attribute 7 = Website shows competence and increases knowledge (U7).
c. Attribute 8 = There is a positive experience given (U8).
d. Attribute 21 = Website makes it easy to communicate (SIQ6).

3. Quadrant III (Low Importance/Low Performance): Low Priority.

This quadrant explains that the attributes in this quadrant are considered not too important so they don't need to be prioritized because visitor expectations for this attribute are low. The attributes contained in this quadrant are as follows:

a. Attribute 17 = Gives a sense of security when visitors access the web-site (SIQ2).
b. Attribute 19 = Website gives room for personalization (SIQ4).
c. Attribute 20 = Website creates a sense of community (SIQ5).
d. Attribute 22 = High level of trust in the information submitted by the website (SIQ7).

4. Quadrant IV (Low Importance/High Performance): Possible Overkill.

This quadrant illustrates that while the performance offered is relatively strong, the features in this quadrant describe items that are less important because visitors don't really expect them. In order to

conserve money and dedicate it to quadrants that need improvement, like those stated in quadrant I, the costs associated with developing features in this quadrant must be lowered.

a. Attribute 2 = Interaction on the website is clear and easy to understand (U2).
b. Attribute 4 = Easy to use (U4).
c. Attribute 6 = Website design according to the type or type (U6).
d. Attribute 10 = Website provides reliable information (IQ2).
e. Attribute 14 = Website provides detailed information (IQ6).
f. Attribute 15 = The website presents information in an appropriate and appropriate format (IQ7).
g. Attribute 16 = Website has a good reputation (SIQ1).
h. Attribute 18 = Website provides a sense of security when visitors include personal information (SIQ3).

4. Customer Satisfaction Index (CSI) Method Analysis

A user satisfaction percentage is the result of CSI, a quantitative measurement. The first step in calculating the CSI value is to determine the average value of performance and user expectations from the distributed surveys. The findings of the CSI analysis, which are shown in Table V, will also be processed using the CSI formula after the average has been calculated. Based on Table V, it is known that the results of the CSI analysis obtained on the news portal website are 67.61%, where this value is found on the CSI scale in the second category of "Satisfied," which denotes that users of the news portal website are satisfied with the effectiveness of the services offered. Based on the findings of the IPA diagram analysis, paying attention to the attributes in quadrant I is one of the activities that may be made to raise the CSI score. In doing so, it is intended that it can raise CSI's total value in order to maximize user happiness, specifically among the general public.

Table 5. CSI Analysis

Indicator	Mean Importance Score (MIS)	Mean Satisfaction Score (MSS)	Weight Factor (WF)	Weight Score (WS)
U1	3,99	3,39	4,63	15,67
U2	3,84	3,47	4,46	15,47
U3	3,98	3,21	4,62	14,81
U4	3,88	3,52	4,50	15,83
U5	4,00	3,09	4,64	14,36
U6	3,88	3,43	4,50	15,41
U7	3,93	3,49	4,56	15,90
U8	3,95	3,52	4,58	16,13
IQ1	3,99	3,32	4,63	15,38
IQ2	3,83	3,57	4,45	15,89
IQ3	4,00	3,13	4,64	14,50
IQ4	3,96	3,35	4,59	15,40
IQ5	4,08	3,28	4,74	15,54
IQ6	3,86	3,47	4,48	15,55
IQ7	3,79	3,40	4,40	14,94
SIQ1	3,86	3,46	4,48	15,51
SIQ2	3,81	3,34	4,44	14,79
SIQ3	3,89	3,46	4,51	15,59
SIQ4	3,85	3,38	4,47	15,09
SIQ5	3,89	3,38	4,51	15,21
SIQ6	4,03	3,40	4,68	15,88
SIQ7	3,91	3,35	4,53	15,20
Total	86.20	74.40		
WT				338,04
CSI				67,61%

Based on the discussion and results of the analysis described earlier, namely measuring the quality of news portal websites using the webqual 4.0, IPA and CSI methods, it can be concluded that overall there are still some problems on the website that need to be repaired, this happens because of the performance indicators or the attribute is not in accordance with the expectations of its visitors.

4. Conclusion

The calculation of the level of conformity of the respondent's data has an average overall value of each indicator of 86% based on the analysis of the news portal web-site using the IPA method, which includes analysis of the level of conformity, analysis of the level of gaps, and analysis of the IPA quadrants. While the results of calculating the gap level get an overall average value of -0.54% or show a negative result. From these results it is stated that the website currently provided still does not meet what is expected by the user so that it makes the user feel dissatisfied with the current website performance. The results of the IPA quadrant analysis show that there are indicators that are still considered critical and need attention for improvement so that the level of user satisfaction with the website can increase. The indicators that need improvement are the 3rd and 5th usability variables regarding ease of navigation and having an attractive appearance. In the information quality variable, the information provided is accurate (IQ1), the information presented is updated (IQ3), provides relevant information (IQ4) and presents information that is easy to understand (IQ5). Based on these indicators, it is hoped that this can be used as an illustration in making improvements by the portal news website manager. According to the news portal website's calculation of customer satisfaction using the CSI technique, the value is 67.61%. These findings demonstrate that users are happy with the effectiveness of the present news portal website. To raise user happiness, which is still below user expectations in Quadrant I according to the findings of the IPA analysis, the website's performance needs to be improved if it is to meet users' expectations to the fullest extent possible.

References

Addas, A., Maghrabi, A., & Goldblatt, R. (2021). Public open spaces evaluation using importance-performance analysis (IPA) in Saudi Universities: The case of King Abdulaziz University, Jeddah. *Sustainability (Switzerland)*, *13*(2), 1–16. https://doi.org/10.3390/su13020915

Afriansyah, A., Walhidayat, W., Novendra, R., & ... (2022). Usability Testing on Tracer Study System Using The Heuristic Evaluation Method. *Journal of Applied Engineering and Technological Science (JAETS)*, *3*(2), 178–184. https://yrpipku.com/journal/index.php/jaets/article/view/807%0Ahttps://yrpipku.com/journal/index.php/jaets/article/download/807/503

Andry, J. F., Christianto, K., & Wilujeng, F. R. (2019). Using Webqual 4.0 and Importance Performance Analysis to Evaluate E-Commerce Website. *Journal of Information Systems Engineering and Business Intelligence*, *5*(1), 23. https://doi.org/10.20473/jisebi.5.1.23-31

Arias-Oliva, M., Pelegrín-Borondo, J., & Matías-Clavero, G. (2019). Variables influencing cryptocurrency use: A technology acceptance model in Spain. *Frontiers in Psychology*, *10*(MAR), 1–13. https://doi.org/10.3389/fpsyg.2019.00475

Asyhari, M. Y., Sussolaikah, K., Sari, E. R. N., & Nita, S. (2022). Heuristic Analysis of the Indonesian Covid-19 Official Website Interface. *International Journal of Advances in Data and Information Systems*, *3*(1), 38–48. https://doi.org/10.25008/ijadis.v3i1.1234

Bhat, J. R., AlQahtani, S. A., & Nekovee, M. (2023). FinTech enablers, use cases, and role of future

internet of things. *Journal of King Saud University - Computer and Information Sciences*, *35*(1), 87–101. https://doi.org/10.1016/j.jksuci.2022.08.033

Bi, J. W., Liu, Y., Fan, Z. P., & Zhang, J. (2019). Wisdom of crowds: Conducting importance-performance analysis (IPA) through online reviews. *Tourism Management*, *70*(September 2018), 460–478. https://doi.org/10.1016/j.tourman.2018.09.010

Budi, S., Gata, W., Noor, M., Pangabean, S., & Rahayu, C. S. (2022). News Portal Website Measurement Analysis Using Iso/Iec 25010 and Mccall Methods. *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(1), 273–285.

Chan, V. H. Y., Chiu, D. K. W., & Ho, K. K. W. (2022). Mediating effects on the relationship between perceived service quality and public library app loyalty during the COVID-19 era. *Journal of Retailing and Consumer Services*, *67*(February), 102960. https://doi.org/10.1016/j.jretconser.2022.102960

Choi, Y., Choi, M., Oh, M., & Kim, S. (2020). Service robots in hotels: understanding the service quality perceptions of human-robot interaction. *Journal of Hospitality Marketing and Management*, *29*(6), 613–635. https://doi.org/10.1080/19368623.2020.1703871

Das, A., & Basu, T. (2020). Assessment of peri-urban wetland ecological degradation through importance-performance analysis (IPA): A study on Chatra Wetland, India. *Ecological Indicators*, *114*(February), 106274. https://doi.org/10.1016/j.ecolind.2020.106274

Esmailpour, J., Aghabayk, K., Abrari Vajari, M., & De Gruyter, C. (2020). Importance – Performance Analysis (IPA) of bus service attributes: A case study in a developing country. *Transportation Research Part A: Policy and Practice*, *142*(May), 129–150. https://doi.org/10.1016/j.tra.2020.10.020

George, A. (2023). A Study on the Assessment of Customer Readiness toward the Adoption of Technological Innovations in Indian Tourism Sector. *Journal of Logistics, Informatics and Service Science, 10*(1), 237-256. https://doi.org/10.33168/JLISS.2023.0113

Hamzah, M. L., Rahmadhani, R. F., & Purwati, A. A. (2022). An Integration of Webqual 4.0, Importance Performance Analysis and Customer Satisfaction Index on E-Campus. *Journal of System and Management Sciences*, *12*(3), 25–50. https://doi.org/10.33168/JSMS.2022.0302

Kurniawan, H. (2022). Application of E-Learning for Online Learning During the Covid-19 Pandemic at University of Pembangunan Panca Budi. *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(1), 42–47.

Ladan Haruna, B., & Madu, A. U., A. (2020). COVID-19 Pandemic and Social Media News in Nigeria. *The Role of Libraries and Library Associations in Information Dissemination*, *7*(2), 9. https://www.researchgate.net/profile/Augustine-Madu/publication/341575045_COVID-19_Pandemic_and_Social_Media_News_in_Nigeria_The_Role_of_Libraries_and_Library_Associations_in_Information_Dissemination/links/5ec7cd17a6fdcc90d68d4028/COVID-19-Pandemic-and-S

Li, Y., & Shang, H. (2020). Service quality, perceived value, and citizens' continuous-use intention regarding e-government: Empirical evidence from China. *Information and Management*, *57*(3), 103197. https://doi.org/10.1016/j.im.2019.103197

Luthfi Hamzah, M., Anisa Hultari, L., Ayu Purwati, A., & Nazaruddin, N. (2022). Analysis Of E-Library Based On Level Of User Satisfaction Using EUCS And IPA Methods. *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(1), 599–610. https://journal.yrpipku.com/index.php/jaets/article/view/1426

Novendra, R. (2020). Analysis Acceptance Of Platform Technology Didimax Berjangka In Pekanbaru Using The UTAUT Method. *Journal of Applied Engineering and Technological Science (JAETS)*, *2*(1), 34–41. https://doi.org/10.37385/jaets.v2i1.173

Novendra, R., Jalinus, N., Rasfira, A., & Lancang Kuning, U. (2022). User Satisfaction Analysis of Service Quality of Dapodik Applications (Educational Data) Using Servqual Method. *Journal of Applied Engineering and Technological Science (JAETS)*, *3*(2), 190–194.

Nuraina, N., Hamidah, A. N., Despal, D., & Taufik, E. (2022). The perception of the farmer on dairy cooperative feed mill logistics service using customer satisfaction index (CSI) and importance-performance analysis (IPA). *IOP Conference Series: Earth and Environmental Science*, *1001*(1). https://doi.org/10.1088/1755-1315/1001/1/012025

Phadermrod, B., Crowder, R. M., & Wills, G. B. (2019). Importance-Performance Analysis based SWOT analysis. *International Journal of Information Management*, *44*, 194–203. https://doi.org/10.1016/j.ijinfomgt.2016.03.009

Pratiwi, N. J., Purwati, A. A., Hamzah, M. L., & Nyoto, N. (2022). The Effect Of Service Quality And Academic Information Systems Quality On Student's Satisfaction. *International Journal of Economics Development Research (IJEDR)*, *3*(1), 51–70. https://doi.org/10.37385/ijedr.v3i1.400

Purwati, A. A., & Hamzah, M. L. (2022). Instrument Readiness Analysis of Technology-Based Businesses. *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(1), 611–617.

Purwati, A. A., Mustafa, Z., & Deli, M. M. (2021). Management Information System in Evaluation of BCA Mobile Banking Using DeLone and McLean Model. *Journal of Applied Engineering and Technological Science (JAETS)*, *2*(2), 70–77. https://doi.org/10.37385/jaets.v2i2.217

Qadir, Z., Le, K. N., Saeed, N., & Munawar, H. S. (2022). Towards 6G Internet of Things: Recent advances, use cases, and open challenges. *ICT Express*, *xxxx*. https://doi.org/10.1016/j.icte.2022.06.006

Qalati, S. A., Vela, E. G., Li, W., Dakhan, S. A., Hong Thuy, T. T., & Merani, S. H. (2021). Effects of perceived service quality, website quality, and reputation on purchase intention: The mediating and moderating roles of trust and perceived risk in online shopping. *Cogent Business and Management*, *8*(1). https://doi.org/10.1080/23311975.2020.1869363

Rabadán-Martín, I., Aguado-Correa, F., & Padilla-Garrido, N. (2019). Facing new challenges in rural tourism: signaling quality via website. *Information Technology and Tourism*, *21*(4), 559–576. https://doi.org/10.1007/s40558-019-00157-y

Ramadani, S. S., Kurniawan, H., & Wijaya, R. F. (2022). Online Attendance System Website-Based At the Village Hall Office Paya Bakung Using the Waterfall Method. *Journal of Applied Engineering and Technological Science*, *4*(1), 505–511. https://doi.org/10.37385/jaets.v4i1.1178

Rerung, R. R., Fauzan, M., & Hermawan, H. (2020). Website Quality Measurement of Higher Education Services Institution Region IV Using Webqual 4.0 Method. *International Journal of Advances in Data and Information Systems*, *1*(2), 89–102. https://doi.org/10.25008/ijadis.v1i2.185

Salih, K. O. M., Rashid, T. A. R., Radovanovic, D., & Bacanin, N. (2022). A Comprehensive Survey on the Internet of Things with the Industrial Marketplace. *Sensors*, *22*(730), 4–30.

Sari, I., Tj, H. W., Wahyoedi, S., & Tirto, B. (2023). *The Effect of Usability , Information Quality , and Service Interaction on E-Loyalty Mediated by E-Satisfaction on Hallobumil Application Users*. *2023*(46), 211–229. https://doi.org/10.18502/kss.v8i2.12765

Sari, R. P., & Henim, S. R. (2022). Measurement and Analysis of Tourism Website User Experience Using Usability Techniques. *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(1), 539–546.

Sudrajat, D., Achdisty, M., Kurniasih, N., Roslina, Parwito, Mulyati, S., Purnomo, A., & Sallu, S. (2019). The Implementation of Innovation in Educational Technology to Improve the Quality of Website Learning in Industrial Revolution Era 4.0 Using Waterfall Method. *Journal of Physics:*

Conference Series, *1364*(1), 0–6. https://doi.org/10.1088/1742-6596/1364/1/012044

Sun, X., Yan, W., Zhou, H., Wang, Z., Zhang, X., Huang, S., & Li, L. (2020). Internet use and need for digital health technology among the elderly: A cross-sectional survey in China. *BMC Public Health*, *20*(1), 1–8. https://doi.org/10.1186/s12889-020-09448-0

Syahidi, A. A., Asyikin, A. N., & Subandi, S. (2019). Measuring User Assessments and Expectations: The Use of WebQual 4.0 Method and Importance-Performance Analysis (IPA) to Evaluate the Quality of School Websites. *Journal of Information Technology and Computer Science*, *4*(1), 76–89. https://doi.org/10.25126/jitecs.20194198

Syahputri, K., Rizkya, I., Siregar, I., & Syardhi, O. C. (2021). Analysis of website service quality with webqual 4.0 integration method. *IOP Conference Series: Materials Science and Engineering*, *1122*(1), 012035. https://doi.org/10.1088/1757-899x/1122/1/012035

Szymkowiak, A., Melović, B., Dabić, M., Jeganathan, K., & Kundi, G. S. (2021). Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. *Technology in Society*, *65*(December 2020). https://doi.org/10.1016/j.techsoc.2021.101565

Tajudeen, F. P., Bahar, N., Tan, M. P., Peer Mustafa, M. B., Saedon, N. I., & Jesudass, J. (2022). Understanding User Requirements for a Senior-Friendly Mobile Health Application. *Geriatrics (Switzerland)*, *7*(5), 1–21. https://doi.org/10.3390/geriatrics7050110

Tandoc, E. C., Thomas, R. J., & Bishop, L. (2021). What is (Fake) news? analyzing news values (and more) in fake stories. *Media and Communication*, *9*(1), 110–119. https://doi.org/10.17645/mac.v9i1.3331

Utami, I. S., Winarno, & Setiadi, H. (2021). Analysis the Effect of Website Quality on User Satisfaction with the WebQual 4.0 Method and Importance-Performance Analysis (IPA) (Case Study: SPMB Sebelas Maret University's Website). *Journal of Physics: Conference Series*, *1842*(1), 0–8. https://doi.org/10.1088/1742-6596/1842/1/012003

Yuliyanto, H., Chotib, C., Subroto, A., Aufa, B. Al, Sancoko, S., & Kusumaningrum, D. (2022). The Perception of SPADA-DIKTI Services in Underdeveloped Area Using Customer Satisfaction Index (CSI) and Importance Performance Analysis (IPA). *Proceedings*, 36. https://doi.org/10.3390/proceedings2022083036

Zhou, Q., Lim, F. J., Yu, H., Xu, G., Ren, X., Liu, D., Wang, X., Mai, X., & Xu, H. (2021). A study on factors affecting service quality and loyalty intention in mobile banking. *Journal of Retailing and Consumer Services*, *60*(December 2020), 102424. https://doi.org/10.1016/j.jretconser.2020.102424

Zulfahmi, A. A., Sadikin, R., & Hermaliani, E. H. (2022). Hybrid between PIECES framework and technology acceptance model (TAM) in quality testing of mobile application office automation system (eKEMENKEU). *Journal of Applied Engineering and Technological Science (JAETS)*, *4*(1), 286–306.