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QUALITY ANALYSIS OF E-LEARNING WEBSITE AT PT XYZ USING MODIFIED WEBQUAL METHOD AND IMPORTANCE PERFORMANCE ANALYSIS

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ABSTRACT
The continuous development of information technology is one of its best features. The steady trend in the rapid advancement of information technology has created a necessity for institutions to adapt in order to remain competitive in this era. Considering the large number of website users in Indonesia, it is evident that the quality of websites as a medium for disseminating information is crucial. This research measures the quality of the e-learning website at PT XYZ using the Modified Webqual and Importance Performance Analysis methods. The Modified Webqual method is an extension of the Webqual 4.0 method, used to measure website quality based on four components: Usability Quality, Information Quality, Interaction Quality, and Privacy and Security. Meanwhile, Importance Performance Analysis is used to measure user satisfaction based on expectations of website quality. Data was collected through questionnaires and then subjected to validity and reliability tests, descriptive analysis, and gap analysis between user perceptions and expectations. Subsequently, the data was categorized using the Importance Performance Analysis method. The final results indicated that the e-learning website at PT XYZ has not yet met user expectations, as indicated by the gap analysis with a value < 0, meaning that user importance or expectations are still higher than the website's performance. This research is part of a collection of articles and papers on the evaluation of the quality of various online platforms, including e-learning websites, and the research methods used are evaluative and quantitative in nature.

I. INTRODUCTION

The continuous development of information technology is one of its best features[1]. The stable trend of rapid information technology development has created a necessity for companies to adapt in order to remain competitive with other businesses. The role of information technology is increasingly significant, as almost all economic and environmental stability is mediated through information technology[2], using the internet as a medium for information dissemination[3]. The primary goals of this study are to assess and enhance the satisfaction of users and the overall quality of the PT. XYZ e-learning website. The research will focus on the following areas of contribution from these objectives:

1. Measuring the quality of PT. XYZ's e-Learning website based on Modified Webqual 4.0.
2. Analyzing factors that can enhance the performance evaluation of PT. XYZ's e-Learning website relative to user expectations.

Faced with the increasing quantity of websites and the rapidly advancing technological landscape, those responsible for managing websites require guidance to help optimize their platforms. This guidance necessitates indicators to evaluate website quality. Therefore, to analyze quality, a comparative method used is the Webqual method, which focuses on evaluating the website quality[4]. This study aims to analyze the quality of the PT XYZ e-Learning website using a developed version of the WebQual 4.0 method. This method measures quality across three components: Usability Quality, Information Quality, and Interaction Quality[5], and is modified by adding a fourth dimension, Privacy and Security, to assess overall website quality. Adding the fourth dimension, Privacy and Security has become essential for fostering user trust in digital platforms because they are fundamental components. They safeguard sensitive user information from unauthorized access, ensuring the confidentiality of personal and financial data. This protection is essential for maintaining user trust, as individuals are more likely to interact with websites they deem secure. Additionally, robust security measures mitigate cyberattacks, such as

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hacking and phishing, which can compromise the integrity of the website and result in data breaches. Furthermore, privacy protections ensure compliance with legal and regulatory requirements[6]. Consequently, the researcher has incorporated privacy and security as key dimensions in the evaluation of modern websites.

To measure the dimensions of WebQual 4.0, the Importance Performance Analysis (IPA) method is employed to assess performance relative to the expected quality. Based on this background, the researcher aims to analyze the quality of the PT XYZ e-Learning website using WebQual 4.0 and Importance Performance Analysis. This approach is expected to provide actual assessments against user expectations, resulting in insights for improvements and further development of the website. Data for this analysis will be collected using a questionnaire with a minimum of 398 respondents calculated using slovin formula, as detailed in the Data, Population, and Sample section of the Research and Method chapter.

In previous research [7], analysis was conducted on three variables: usability, information quality, and service interaction, similar to the study by Kevin Christianto [8], which also utilized the same three variables. However, the current study differs by adding an additional variable: privacy and security. Despite this difference, a similarity is observed in the gap analysis calculation, where the overall gap analysis result is < 0.

II. RESEARCH AND METHOD

A. *Modified Webqual*

Webqual is a technique or method for measuring website quality based on end-user perceptions[9]. Webqual is an extension of SERVQUAL designed to measure service quality[10]. In this context, the concepts and principles of SERVQUAL are implemented in the context of measuring website quality. Based on the research by Barnes & Vidgen in 2002, Webqual 4.0 is divided into three dimensions: usability, information quality, and interaction quality[11]. With the advancement of technology, security and privacy have become necessary, as evidenced by Liu's research, which found that user privacy and security are crucial aspects of using online media[3]. Incorporating Privacy and Security as a fourth dimension has become crucial for cultivating user trust in digital platforms. These elements are fundamental, as they protect sensitive user information from unauthorized access, ensuring the confidentiality of personal and financial data. Such protection is vital for sustaining user trust, as individuals are more inclined to engage with websites they consider secure. Moreover, robust security measures help mitigate cyberattacks, such as hacking and phishing, which can compromise website integrity and lead to data breaches. Additionally, privacy safeguards ensure adherence to legal and regulatory requirements, thereby reinforcing the overall security framework. This is important for building user trust in the use of online media[6]. Based on this, the researcher added the dimension of privacy and security as a critical aspect in the context of contemporary websites[12].

B. *Importance Performance Analysis (IPA)*

Importance Performance Analysis, developed by Martilla and James in 1977, is used to measure the relationship between user perceptions and the importance of quality improvement. This method was originally developed in the tourism and hospitality industry to evaluate the significance of service attributes and gauge customer satisfaction [13]. Importance Performance Analysis has been utilized in responding to and developing marketing strategies because this method helps companies understand user desires and needs[9]. Due to its cost-effectiveness and the ease with which the results can be interpreted[14] and researchers primarily use it due to the positive correlation between feature performance and importance levels[15].

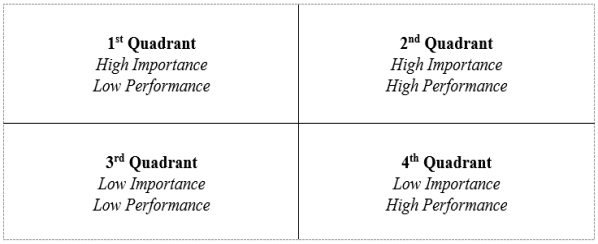

Figure 1. Cartesian Diagram

In this research, Importance Performance Analysis is divided into four quadrants, which are based on the priority levels of user needs to determine the order of improvements:

1. First Quadrant (High Importance, Low Performance) must be prioritized in website development because it has a high level of importance but does not yet meet user expectations, necessitating prompt improvements

or development.

2. Second Quadrant (High Importance, High Performance) having a high level of importance coupled with high performance places this quadrant as a supporting factor for user satisfaction, thus it needs to be maintained.
3. Third Quadrant (Low Importance, Low Performance) having a low level of importance combined with average performance and relatively low expectations results in minimal benefit to what users perceive.
4. Fourth Quadrant (Low Importance, High Performance) having a low level of importance combined with excessively high performance means that the organization should reallocate resources from this quadrant to other quadrants that require performance improvements.

Using a matrix design (cartesian diagram), IPA analysis involves comparing the importance of a subject or dimension's characteristics with the performance of these features. This approach enables researchers to make more precise recommendations by evaluating the indicators more effectively[16].

C. *Research Method*

To start the research, the first step involves a case study observation. The researcher's involvement in developing the website has already provided insight into the problems to be studied and the suitable methods to use. Next, research objectives and hypotheses are formulated based on the case study and problem identification. A literature review is conducted to find relevant studies for reference. The questionnaire is based on modified Webqual 4.0 dimensions: usability, information quality, interactivity, and security & privacy. Responses use a Likert scale from 1 to 5, aiding data grouping and analysis. Validity and reliability tests are essential before processing data. Once data is confirmed valid and reliable, analysis is performed using the Importance Performance Analysis (IPA) method, aiming to achieve research objectives and provide conclusions and recommendations.

D. *Data, Population, Sample*

To determine the sample size for this study, a probability sampling formula is required, which the author outlines below:

$$n = \frac{N}{1+n\,e^2} \tag{1}$$

Formula (1) is the Slovin formula, applicable for a confidence level of 95%. The researcher selected a 10% margin of error due to constraints on research time and interaction with respondents. A 10% margin of error indicates that the sample results may deviate by ±10% from the true population values. This level of precision offers a practical compromise between accuracy and feasibility, particularly when constraints such as limited time and budget are factors. This margin is sufficient for detecting overall trends and patterns within the population, thereby enabling researchers to make informed decisions without necessitating a very large sample size. However, for research that demands higher precision, a smaller margin of error should be utilized[17] .With a target population of 64,506 individuals based on the population at e-learning PT. XYZ website, this calculation results in a minimum required sample size of 398 respondents. However, the researcher received responses from exact 398 respondents. Exceeding the minimum sample size enhances the accuracy of the research findings. An increased sample size typically enhances the precision of estimates and reduces the margin of error, thus leading to more accurate and dependable results[17].

To gather data, the research employed both literature review and questionnaire distribution methods. The literature review provided theoretical and knowledge-based data pertinent to the study. Data collection involved distributing the questionnaire via the PT XYZ e-Learning website and utilizing Google Forms. The survey was prominently featured on the e-learning platform to target relevant users. In contrast, the questionnaire yielded quantitative data, consisting of responses to the statements outlined in Table 1.

TABLE I.
OPERATIONAL VARIABLES

Dimension	Indicator	Code
Usability	The website is easy to understand and operate.	DU1
	The website's interface is clear and user-friendly.	DU2
	The website has an attractive design.	DU3
	The website's design is appropriate for an e-Learning site.	DU4
	The website has a positive impact on users.	DU5
Information quality	The information on the website is reliable.	DIF1
	The website provides relevant information.	DIF2
	The website presents information in a language that is easy to understand.	DIF3

Interaction quality	The website has a good reputation.	DIT1
	The website allows for personalization.	DIT2
	The website facilitates easy communication.	DIT3
Security and privacy	The website performs authentication appropriately for its use.	DSP1
	Users feel their personal information is secure on the website.	DSP2

III. Results and Discussion

A. Validity and Reliability Test

The validity test ensures that the measurement instrument is appropriate for the research variables, while the reliability test assesses the consistency of the data. Successful results in both tests enhance the confidence and quality of the research data, thereby strengthening the conclusions and recommendations. In the validity test, if the R Count value is greater than the R Table value, the data is considered valid. Table 2 presents the results of the validity testing for each performance and importance indicator.

TABLE II.
VALIDITY TESTING RESULT

Code	R Count		R Table	Results
	Performance	Importance		
DU1	0.744	0.742	0.113	Valid
DU2	0.819	0.819	0.113	Valid
DU3	0.805	0.809	0.113	Valid
DU4	0.816	0.808	0.113	Valid
DU5	0.814	0.796	0.113	Valid
DIF1	0.820	0.830	0.113	Valid
DIF2	0.822	0.827	0.113	Valid
DIF3	0.810	0.807	0.113	Valid
DIT1	0.819	0.814	0.113	Valid
DIT2	0.806	0.807	0.113	Valid
DIT3	0.781	0.808	0.113	Valid
DSP1	0.791	0.785	0.113	Valid
DSP2	0.769	0.744	0.113	Valid

For the reliability test, if the Cronbach's alpha value exceeds 0.70, the data used in this research can be considered reliable[18]. The Cronbach's alpha values obtained in this study are presented in Table 3.

TABLE III.
RELIABILITY TESTING RESULTS

Reliability Testing Description		
Reference Value	Croanbach's Alpha Value	Conclusion
0.7	0.976	Reliable

B. Descriptive Analysis

In this research, Descriptive Analysis is used as the primary method for data collection and analysis[19]. The aim is to describe the thoughts and views of respondents regarding the variables, which include Usability, Information Quality, Interaction Quality, and Security and Privacy. This approach allows for a systematic explanation of data collection and an in-depth examination of two assessment indicators: Importance and Performance. To apply descriptive analysis, a range value is needed to categorize the results from the variables mentioned above. After collecting responses from 398 participants, calculations are made to determine the range value.

First, the researcher calculates the cumulative score for each respondent's answers using the following formula:

$$Maximum\ cumulative\ score = 398 \times 5 = 1990$$
$$Minimum\ cumulative\ score = 398 \times 1 = 398$$

Next, the percentage values are calculated by dividing the cumulative score by the frequency and multiplying by 100%.

$$Maximum\ percentage = \left(\frac{1990}{1990}\right) \times 100\% = 100\%$$

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$$Minimum\ percentage = \left(\frac{398}{1990}\right) \times 100\% = 20\%$$

To obtain the range value, subtract the minimum percentage from the maximum percentage and divide by the number of scales, which is 5. The result is 16%, and this range value is used to divide the continuum line into five categories. Which shown in Figure 2.

After establishing the continuum line, the next step is to process the data based on the performance and

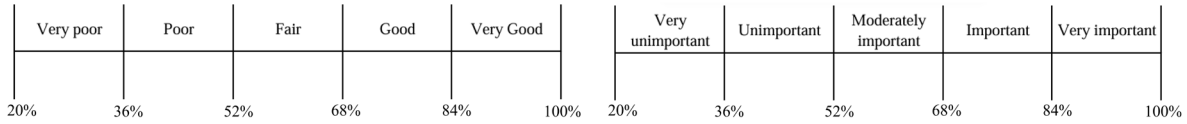

Figure 2. Continuum Line

importance variables to categorize each variable according to the obtained percentage values. Table 4 presents the results of the descriptive analysis calculations.

TABLE IV.
THE RESULTS OF THE DESCRIPTIVE ANALYSIS

Dimensions	Performance		Importance		Ideal Score
	Score	Category	Score	Category	
Usability	9046 (91%)	Very Good	9136 (92%)	Very Important	9950
Information Quality	5565 (93%)	Very Good	5616 (94%)	Very Important	5970
Interaction Quality	5455 (91%)	Very Good	5523 (93%)	Very Important	5970
Security and Privacy	3661 (92%)	Very Good	3701 (93%)	Very Important	3980

C. *Gap Analysis*

The gap analysis between importance and performance on the e-learning PT. XYZ website aims to identify the difference between performance and importance based on the indicators in the modified Webqual 4.0. To calculate the gap value, the researchers used formula (2). The resulting gap values are presented in Table 5.

$$GAP = performance(i) - importance(i) \quad (2)$$

TABLE V.
GAP ANALYSIS RESULTS

Code	Performance	Importance	Gap
DU1	4.46	4.50	-0.04
DU2	4.52	4.58	-0.06
DU3	4.53	4.57	-0.04
DU4	4.54	4.57	-0.03
DU5	4.63	4.69	-0.05
DIF1	4.67	4.71	-0.04
DIF2	4.64	4.69	-0.05
DIF3	4.65	4.68	-0.04
DIT1	4.62	4.66	-0.04
DIT2	4.56	4.62	-0.06
DIT3	4.45	4.57	-0.07
DSP1	4.58	4.63	-0.06
DSP2	4.60	4.65	-0.04
Average	4.58	4.63	-0.05

The gap analysis results for the PT XYZ e-learning website show a gap value of -0.05, with all indicator values being less than 0. Although close to zero, this negative value indicates the website does not fully meet user expectations, suggesting a need for quality improvements based on user needs. A negative gap signifies that the website's performance lags behind its perceived importance among users. This indicates certain areas require attention and enhancement. Analyzing specific indicators with the most significant negative gaps can help pinpoint critical areas for immediate improvement. Common patterns in the negative gaps may include issues with user interface design, content accessibility, loading speed, or interactive features. Addressing these areas with the largest negative gaps will allow PT XYZ to prioritize enhancements that align closely with user expectations, thereby improving overall user satisfaction and trust in the e-learning platform.

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D. Outcomes of the Importance Performance Analysis

The outcomes of the Importance Performance Analysis (IPA) are presented as coordinate points on a Cartesian diagram, derived from the average values of the importance and performance indicators.

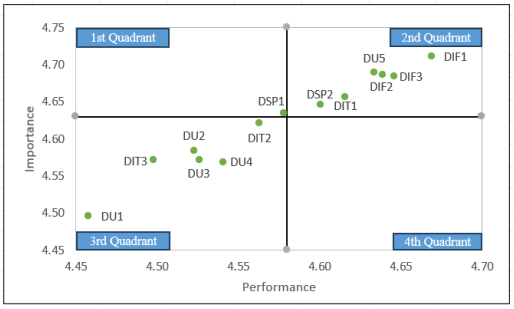

Figure 3.Result of Importance Performance Diagram in Cartesian Diagram

The coordinate points in Figure 3 represent each indicator. In 1st quadrant, it is evident that user needs are highly important, but the performance of the e-learning PT. XYZ website is inadequate or falls short of these needs. Consequently, the indicators in 1st quadrant are crucial and should be prioritized for enhancing the website. Table 6 shows indicators contained in 1st quadrant.

TABLE VI.
1ST QUADRANT

1st Quadrant		
Dimension	Code	Indicator
Security and Privacy	DSP1	The website performs authentication appropriately for its use.

2nd Quadrant demonstrates that user needs are highly important and that the performance of the e-learning PT. XYZ website is satisfactory, meeting user expectations. Therefore, the indicators in 2nd Quadrant should focus on maintaining their current performance levels. Table 7 presents the indicators located in 2nd Quadrant.

TABLE VII.
2ND QUADRANT

2nd Quadrant		
Dimension	Code	Indicator
Usability	DU5	The website has a positive impact on its users.
Information Quality	DIF1	The information on the website is reliable.
	DIF2	The website provides relevant information.
	DIF3	The website presents information in a language that is easy to understand.
Interaction Quality	DIT1	The website has a good reputation.
Security and Privacy	DSP2	Users feel their personal information is secure on the website.

3rd Quadrant indicates that while the performance of the e-learning PT. XYZ website is low and does not meet user needs, the importance of these needs is also low. Consequently, the indicators in 3rd Quadrant are not prioritized for website improvement. Table 8 presents the indicators found in 3rd Quadrant.

TABLE 1.
3RD QUADRANT

3rd Quadrant		
Dimension	Code	Indicator
Usability	DU1	The website is easy to understand and operate.
	DU2	The website's interface is clear and user-friendly.
	DU3	The website has an attractive design.
	DU4	The website's design is appropriate for an e-Learning site.
Interaction Quality	DIT2	The website allows for personalization.
	DIT3	The website facilitates easy communication.

4th Quadrant is observed that the significance of user needs is minimal while the performance of the e-learning PT. XYZ website is satisfactory or meets user requirements. Consequently, the indicators within 4th Quadrant do not require enhancement, given that their performance is deemed adequate. After analysis and categorization, no indicators have been identified in the 4th Quadrant.

In different research[20], if we compared notable differences exist in the variables used for analysis. This study employed the WebQual 4.0 framework as its analytical foundation, a framework widely accepted in prior studies. However, this researcher chose to modify WebQual 4.0 by incorporating security and privacy variables. These additions offer a more comprehensive dimension for evaluating website quality, addressing aspects that may not have been covered in previous research.

After undergoing several stages of analysis, the data will be concluded, and recommendations will be drawn based on the research findings. Data for this study were collected through a questionnaire distributed via Google Forms to gather information from respondents. The respondents for this study were frontline workers (Frontline People, Deliverymen, Customer Retention Officers, and Network Leaders) at PT XYZ, who are also users of the PT XYZ e-learning website. The study aimed to analyze the quality of the PT XYZ e-learning website using a modified WebQual 4.0 framework, encompassing dimensions of usability, information quality, interaction quality, and security and privacy. The predetermined sample size was 398 respondents from the website's user population, with a margin of error of 5%. The researchers successfully obtained 398 responses, with the majority being frontline workers from PT XYZ. Once the data were collected, they were analyzed using several methods. Descriptive analysis was used to describe the data characteristics, gap analysis was employed to identify discrepancies between respondent expectations (Importance) and perceptions (Performance) of various variables, and Importance-Performance Analysis (IPA) was conducted to evaluate and categorize the importance of these variables into four quadrants.

In the descriptive analysis, the usability performance variable scored 9046, with a percentage of 91%, against an ideal score of 9950. According to the continuum scale, this percentage indicates that the usability performance of the PT XYZ e-learning website falls into the "very good" category. The usability importance variable scored 9136, with a percentage of 92%, against the same ideal score of 9950. This percentage indicates that the usability importance falls into the "very important" category. For the information quality variable, the performance score was 5565, with a percentage of 93%, against an ideal score of 5970. This percentage places the information quality performance in the "very good" category. The information quality importance score was 5616, with a percentage of 94%, against the same ideal score of 5970, indicating it is "very important."

The interaction quality variable's performance score was 5455, with a percentage of 91%, against an ideal score of 5970. This percentage indicates that the interaction quality performance is "very good." The interaction quality importance score was 5523, with a percentage of 93%, against the ideal score of 5970, indicating it is "very important." For the security and privacy variable, the performance score was 3661, with a percentage of 92%, against an ideal score of 3980. This percentage places the security and privacy performance in the "very good" category. The importance score for security and privacy was 3701, with a percentage of 93%, against the same ideal score of 3980, indicating it is "very important." In the gap analysis between importance and performance, the gap value was -0.05, and the overall values for each indicator were less than 0, leading to the conclusion that the PT XYZ e-learning website has not yet met user expectations. The analysis revealed varying degrees of gaps between different indicators. The largest gap was found in the dimension code DIT3, "The PT XYZ e-learning website makes it easy for users to communicate with each other." The smallest gap was in the dimension code DU4, "I feel that the PT XYZ e-learning website meets the needs appropriate to the type of website.".

Based on the results Importance Performance Analysis (IPA), specific recommendations can be made for indicators in both the first and second quadrants to enhance the PT. XYZ e-learning website's overall performance.

First Quadrant, the website performs authentication appropriately for its use: This area is critical but currently underperforming, suggesting that improvements are necessary. To address this, the website should implement more robust authentication protocols, such as two-factor authentication (2FA), to enhance security and user confidence. Additionally, streamlining the authentication process to make it faster and more user-friendly while maintaining security standards is essential. Regular security audits and updates to the authentication system can also help in keeping the platform secure and responsive to emerging threats.

Second Quadrant, the website has a positive impact on its users, the information on the website is reliable, the website provides relevant information, the website presents information in a language that is easy to understand, the website has a good reputation, and users feel their personal information is secure on the website. To improve in areas like positive user impact and reliable information, regularly update content, simplify language, and enhance security measures. Strengthen the website's reputation through user testimonials and success stories.

Third Quadrant, while lower priority, improving the user interface, personalization, and communication features could enhance overall user experience, focusing first on more critical areas.

Fourth Quadrant, no indicators fall within the fourth quadrant, suggesting that none of the factors are perceived

as low in both importance and performance. This is positive, as it implies that resources and efforts are well-aligned with user expectations, with no areas being overlooked or underperforming in aspects that users deem unimportant. By addressing the areas identified in the first and second quadrants, PT XYZ can strategically improve its e-learning website, focusing on both immediate performance gaps and sustaining strengths that contribute to user satisfaction.

IV. CONCLUSION

Based on the results of a gap analysis conducted with 398 frontline workers at PT XYZ using the company's e-learning website, it is concluded that the website requires improvement, as it does not meet user expectations. The average gap value is -0.05, and all indicators in the gap analysis table have a gap value <0, indicating that the website's performance falls short of the level of importance expected by users. Furthermore, Importance Performance Analysis (IPA) results suggest that the e-learning website should prioritize enhancements in several key areas, particularly in user authentication. Additionally, some indicators have met user expectations and can serve as benchmarks for maintenance, including positive impact, trust, relevant information, easy-to-understand information, good reputation, and security in handling personal information. There are also indicators that, while not top priorities, still require improvement. These include ease of understanding website operations, competence, appearance, reputation, and ease of communication. For future research, it is recommended to expand the respondent sample size to improve data accuracy by including at least 25% of each frontline worker position at PT XYZ. Moreover, combining research methods, such as interviews and direct observation, is suggested instead of relying solely on questionnaires for data collection.

APPENDIX

n : Minimum required sample size
N : Population Size
e : Margin of Error

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