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Measuring the Quality of Higher Education Website using Webqual Method and Importance-Performance Analysis

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Abstract

Website is one of the necessities needed by organizations, including educational organizations. Telkom University Jakarta Campus (TUJC) is an educational organization that needs it. Analysis methods needed to be conducted to find what needed to be improved. WebQual is utilized to gain this insight. Web Quality Index and Importance Performance analysis are performed to calculate the results. The results of the Web Quality index show that users' perspective is 60% on average and got a negative gap analysis. Therefore, the website needs improvements to satisfy the user. Importance Performance Analysis is used to find the indicator that needs improvement. The Importance Performance Analysis shows that timely website information and security are the main priority for improvement.

Keywords: *IPA, Website, WebQual, WQI.*

1 Introduction

Nowadays, a good website can be compared to the face of any organization. Organizations typically use a website to showcase their event, profiles, and other information the public needs to know about their organization—as an example, in their research, Wang et. Al. found that in the hotel industry, the website's richness could give the website user a good experience [1]. Another research conducted by Al-Mansra also found that good usability and service interaction in the telecommunications sector website could enhance the user experience [2].

From this research, we know that having a good website is a must for any organization, including higher education. Manzoor et. Al., in their research, mentioned why higher education, in this case, university-level education, needs a good website. The reasons are to give a good impression to the student candidates, as the portal to the University facility and Information, and as the tools for managing the organization's daily activities [3]. Schimmel study also emphasized the need for universities to have attractive and clearly understood webpages with readily navigable information on such characteristics as programs, course offerings, location, and relevant accreditations [4]. Therefore, having a good website organization is a must to achieve these goals.

Some research also found how important the website for higher education is. Aprianti et al. found that a University website with good quality could improve user interaction with the website [5]. Furthermore, a good quality website also could enhance the eWOM of the organization. Pourjahanshahi found this finding in their research [6]. Therefore, it enhances the organization, in this case, the university exposure.

A good website needs to meet several indicators. Al Dulaimi and Al Mashhadany define a good quality website as having some properties that are gainfulness, useable, available, useful, and reliable [7]. Another research also mentioned having good Information on their website and a good user experience, like its ease of use and good user interface[6], [8]–[10].

To achieve this quality, Telkom University Jakarta Campus is one of the universities in Jakarta. TUJC uses the website as the dashboard where the student candidates get admission information; students get the Information about the campus activity information and as the tools for learning and operational management for the faculty's staff. A higher education instutions's website now is an important tool in the information gathering stage in the branding and consumer decision making process. Potential students' first impressions are influenced electronically via the website. A

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university's web presence is extremely important because visiting the website first is found to be a precursor to visiting the campus [4]. Looking at how important the website is, we need to assess the TUJC Website's quality. Comprehensive evaluation of the TUJC website is needed to later provide recommendations for the improvement and development of a sustainable institutional website.

There were a lot of tools to assess the quality of information systems, such as WebQual, SUS, PSQUAL, and other frameworks. But, in this research, we will use WebQual because WebQual focuses more on website usability. The website that will be measured in this research is the TUJC website.

2 Literature Review

In this research, we used WebQual as the assessment Methodology. WebQual was developed by Barnes and Vidgen in 2002 [11], [12]. In Barnes and Vidgen's research, they used WebQual to assess the use of eCommerce. WebQual has developed since 2000, now in its 4th Version, generally known as WebQual 4.0. We used a Questionnaire to gather data and used three independent variables: Usability, Information Quality, and Service Interaction. We used User Satisfaction as the dependent variable in the WebQual Models.

WebQual 4.0 provides its own calculation method called WQI (WebQual Index). To calculate the WQI, we used the Formula mentioned in Formula (1).

$$WQI = Weighted\ Score / Max\ Score \quad (1)$$

The WQI was calculated for each of the indicators used in the research. This way, we could identify the most important indicators of the research.

The next step of the process is

In this research, we clustered the variable into four quadrants using IPA Analysis. IPA Analysis itself is an analysis to determine which variable needs to be prioritized to maximize user satisfaction [13], [14]. Using this method, we could also gain insights about what area needs to be improved in the product, in this case, the website implemented by TUJC [15]. Figure 1 shows the IPA quadrants used in this research.

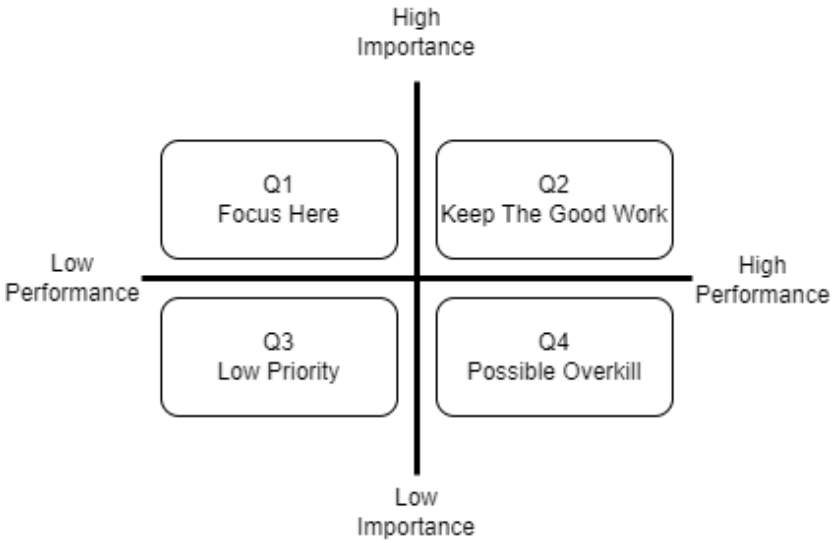

Figure 1. IPA Diagram Quadrant

In Figure 1, we can see that the quadrant is split into several quadrants based on the previous research [13], [14],[16],[17], which are :

a. Quadrant 1 Focus Here: This Quadrant shows what the user perceives as important but has low Performance
b. Quadrant 2 Keep the Good Work: This quadrant shows the indicators that are done right.
c. Quadrant 3 Low Priority: This quadrant shows indicators that need not be concerned with.

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d. Quadrant 4 Possible Overkill: This quadrant shows indicators that do need to be done but done excessively.

This quadrant shows which indicators need attention and which are not to enhance the website's quality.

We used Formula as shown in Formula (2) and (3) to calculate which indicators goes to which quadrant. using these formulas, we will gain the indicator coordinates in the quadrants.

$$\bar{X} = \frac{\sum X}{n} \quad (1)$$

Where $\bar{X}$: Average point of Performance
x: Sum of the performance point
n: the number of respondents

$$\bar{Y} = \frac{\sum y}{n} \quad (2)$$

Where $\bar{Y}$: Average point of Importance
y: Sum of the importance point
n: the number of respondents

After calculating the position of each indicator, the next step is to determine how to divide the quadrants. We used Formula in Formula (4) to define the position of the quadrants. [18][14]. Using this Formula, we determine the average Importance and Performance position for the quadrants divider.

$$\bar{\bar{X}} = \frac{\sum \bar{x}}{n} \; and \; \bar{\bar{Y}} = \frac{\sum \bar{Y}}{n} \quad (4)$$

Where n: the number of indicators.

3 Research Methodology

In order to conduct the research, we employed methodology. The methodology of this research started with literature review till the conclusion step. The research methodology can be seen in Figure 2.

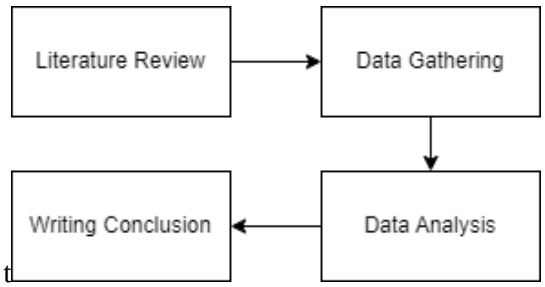

Figure 2. Research Step

The first step of this research is conducting a literature review. In this step, we gathered the literature about WebQual and IPA analysis. The result of this step is the Literature Review included in the literature review chapter of this paper.

The next step is the data-gathering step. To gather the data needed in this research, we used a questionnaire. The questionnaire has 17 indicators based on the WebQual variables: usability, Information, and service interaction. The population of this research is the students of TUJC and used a five-point Likert scale.

To calculate the number of samples needed in this research, we used Slovin methods. The Formula of Slovin methods can be seen in Formula (5).

$$n = \frac{N}{(1+Ne^2)} \quad (5)$$

Where: n = the samples needed
N = The Populations

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e = Error margins

after gathering the data needed, we conducted the data analysis. This step calculates each indicator's Importance and Performance average score and the IPA and WQI index. After calculating WQI and IPA, we analyzed the results and concluded from the data.

4 Results and Analysis

Population and Samples

We used a five-scale Likert questionnaire developed based on the variables in Figure 1 to test our hypotheses. The population of this research is the students of TUJC, which are about 300 people. This research used Slovin methods to calculate the number of samples needed. The Slovin sampling formula can be seen in formula (5). *n*using the Slovin method with the error of 0.1, we got the minimum participants is 75 people. The indicators used in this research can be seen in Table 1.

Table 1. WQI Indicators

Webqual Dimension	Indicators	Question
Usability	W1	TUJC Website gives operational ease of use by providing a good navigation in the website
	W2	The interaction with the TUJC website is clear and easy to understand
	W3	TUJC Website has a good UI
	W4	The design of the TUJC website is appropriate.
	W5	TUJC Website gave a good user experience
Information Quality	W6	TUJC Website could give accurate information
	W7	TUJC Website could give trusty information
	W8	TUJC Website could give timely information
	W9	TUJC Website could give relevant information
	W10	TUJC Website could give easy-to-understand information
	W11	TUJC Website could give detailed information
	W12	TUJC Website could give appropriate information
Service Interaction	W13	TUJC Website has a good reputation
	W14	TUJC Website could give a sense of security to the users when conducting a transaction
	W15	TUJC Website could give a sense of security to the user's privacy data
	W16	TUJC Website gives an easy way to communicate with stakeholders
	W17	After using the website, I am convinced that the data is accurate, as shown in the website.

From the data-gathering step, we could gather 96 data from respondents. After gathering the data, We analyze the indicators' average of the Importance and Performance variables. The calculation result can be seen in Table 2.

Table 2. Average Score of Importance (Y) and Performance (X)

Indicators	∑X	Ave X	∑Y	Ave Y
W1	326	3,432	406	4,274
W2	316	3,326	401	4,221
W3	319	3,358	401	4,221
W4	316	3,326	391	4,116
W5	321	3,379	414	4,358
W6	321	3,379	429	4,516
W7	327	3,442	422	4,442

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W8	313	3,295	422	4,442
W9	322	3,389	412	4,337
W10	324	3,411	414	4,358
W11	322	3,389	420	4,421
W12	326	3,432	424	4,463
W13	320	3,368	404	4,253
W14	319	3,358	415	4,368
W15	318	3,347	414	4,358
W16	312	3,284	404	4,253
W17	326	3,432	401	4,221

After calculating the Importance and Performance average score, the next step is calculating the WQI—table 2 shows the WQI results.

Table 3. WQI

Indicators	Ave X	Ave Y	Max Score	Weight Score	WQI	Gap Analysis
W1	3,432	4,274	21,368	14,665	0,686	-0,842
W2	3,326	4,221	21,105	14,041	0,665	-0,895
W3	3,358	4,221	21,105	14,174	0,672	-0,863
W4	3,326	4,116	20,579	13,690	0,665	-0,789
W5	3,379	4,358	21,789	14,725	0,676	-0,979
W6	3,379	4,516	22,579	15,259	0,676	-1,137
W7	3,442	4,442	22,211	15,290	0,688	-1,000
W8	3,295	4,442	22,211	14,636	0,659	-1,147
W9	3,389	4,337	21,684	14,700	0,678	-0,947
W10	3,411	4,358	21,789	14,863	0,682	-0,947
W11	3,389	4,421	22,105	14,985	0,678	-1,032
W12	3,432	4,463	22,316	15,316	0,686	-1,032
W13	3,368	4,253	21,263	14,325	0,674	-0,884
W14	3,358	4,368	21,842	14,669	0,672	-1,011
W15	3,347	4,358	21,789	14,587	0,669	-1,011
W16	3,284	4,253	21,263	13,967	0,657	-0,968
W17	3,432	4,221	21,105	14,485	0,686	-0,789
Average	4,331	3,373	21,653	14,610	**0,675**	-

From Table 2, we can see that the result of WQI is above 0,6 or 60%. This result shows that the user of the TUJC website was not perceived as good enough by the user of the website. Therefore, TUJC must conduct several website improvements based on the WQI results. From Table 2, we can see that we got negative GAP analysis results. These negative results showed that this website's user expectation was not achieved.

After calculating the WQI and Gap, we could determine the IPA of the TUJC website. Figure 3 shows The IPA calculation results.

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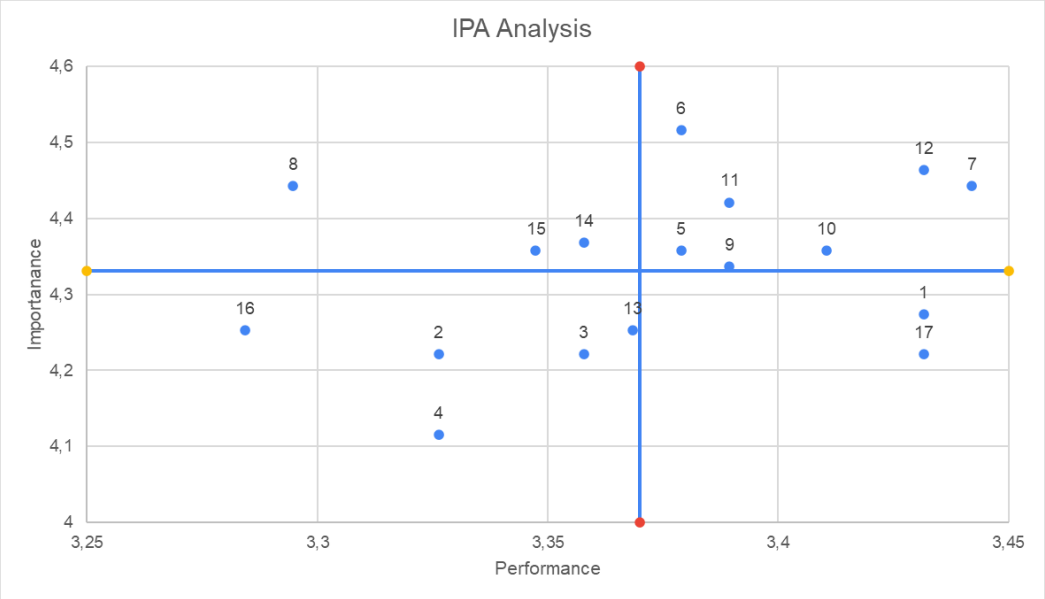

Figure 3. IPA Analysis

Figure 3 shows that the indicators do not cluster in one quadrant but are pretty evenly distributed. Therefore, we could conclude that several indicators were underperformed, and some were overkilled. The results of the quadrants can be read as:

Quadrant 1 Focus Here (High Importance Low Performance)

The first quadrant could indicate what users want and need, but not presented by the website. The indicators are W8, W15, and W14. These indicators tell us about the security (W14and W15) and the timely information on the website. We could conclude that the users of the TUJC website perceive that the information on the website is old and not up to date. This indicator also tells us that the website doesn't show the information the users need. The next indicators are W14 and W15, which tell us that the user still perceives this website as unsecured. Therefore, as website administrators, we need to ensure that the information is up to date, timely, and gives users a sense of security. These indicators became the priority in the next website update.

As we know, website security has become one of the biggest concerns today. This concern arose because security attacks happened in Indonesia in the past few years. TUJC, as the website administrator, needs to increase the sense of security from the website if they want to increase the user perspective of this website.

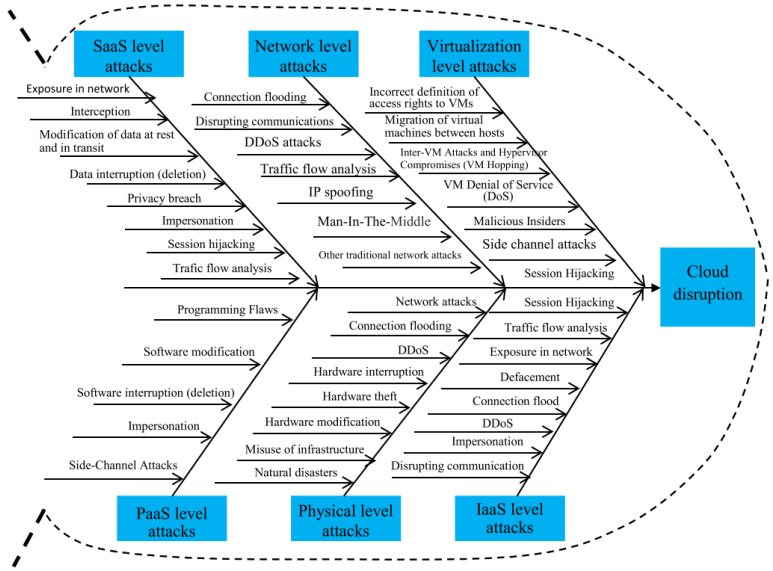

Figure 4. Abdullayeva Category of Security Attack [19]

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Dong et al, and Abdullayeva [19], [20] identified some of the most frequent attack in website and any system that using cloud as their backbone. Abdullayeva categorized the security attack into several categories which can be seen in Figure 4. Since cloud primarily served via web service, this attack also found on website. Dong also found several attack which focused on website. The results of their research can be seen in Figure 5.

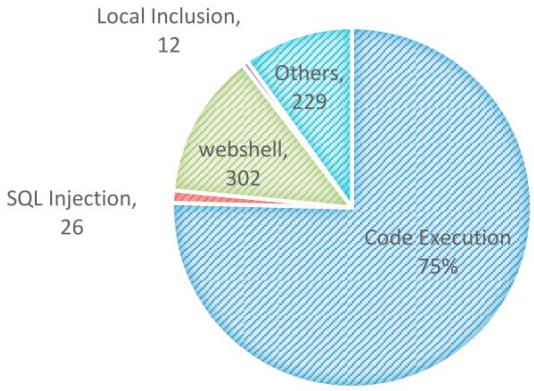

Figure 5. Website Attack Occurrence [20]

There were several ways to increase the website security and prevent the attack. Dong et al, propose some prevention solution. The solution they proposed are [20]:

a. Enable cloud protection service
b. Enable web Application Firewall
c. Baseline Check
d. Conduct Active Defense Measures and
e. Conduct Vulnerability Management

Administrator of TUJC could implement this prevention solution to enhance the user perception about the website security.

Quadrant 2 Keep the Good Work

In this quadrant, we have seven indicators, which are W5, W6, W7, W9, W10, W11, and W12. If indicators are positioned in this quadrant, they can be perceived as the accepted indicators. Almost all the indicators related to information quality are accepted by users. This results tells us that the user perceived the information quality of the website as enough. Users also feel that this website gives them a good user experience (W5).

Quadrant 3 Low Priority

We have five indicators positioned in this quadrant. The indicators are: W2, W3, W4, W13, and W16. The quadrant tells us that the user perceived these indicators as not the development priority. These indicators mainly tell about the user interface. Therefore, we don't need to focus on UI in the next development.

Quadrant 4 Possible Overkill

In this quadrant, we could see what we focused on but not necessarily perceived as important from the user's perspective. Only two indicators are positioned in this quadrant, which are W1 and W17. W1 focused on the website's navigation, and W17 concentrated on the accuracy of data shown on the webpage. Looking at the results, the administrator of this website was way too focused on these two indicators, and the users were not that concerned with it. Therefore, admin could leave these two indicators and focus on indicators in Quadrant 1

5 Conclusion

From the results of this research, we found that the TUJC website needs a lot of improvements. We concluded this from the results of Table 3, which show us that the WQI index of each indicator in averages around 60% acceptance. The GAP analysis results show that the calculation results are less than zero or get negative results. Therefore, the administrator of the TUJC Website needs to improve their website quality. The IPA graphic in Figure 3 shows what the administrator needs to address to

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improve the user perspective of the website. The indicators they need to improve are shown in quadrant 1, which are W8, W15, and W14.

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