ISSN 2085-4579

Evaluation of Ultima InfoSys Site Usability Using Usability Test & System Usability Scale Method

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Accepted 06 October 2022
Approved 19 December 2022

***Abstract* — Web Ultima Infosys is one of the websites owned by Universitas Multimedia Nusantara (UMN), which contains a collection of papers majoring in information systems. Based on the results of a survey conducted on the Ultima Infosys website for information system students, many students feel that the website's appearance is lacking or difficult to use. Especially in journal search and journal submission. Therefore, the usability evaluation of the Ultima Infosys web was carried out. The method used in this research is a usability test and system usability scale (SUS). Where the researcher will evaluate using questionnaires and interviews. The results of the questionnaire were measured using SUS. Based on the results of the evaluation score that SUS has measured, the result is a score of 50.25. Knowing that the score is below the average, a recommendation for improvement is made in the form of a mockup. After re-testing and measuring using SUS, the mockup of the recommendation results got a value above the average of 81,265. Thus, it can be concluded that the mockup of the recommendations proved to be easier to understand and use by users.**

Index Terms—*Web Ultima Infosys; Usability Evaluation, Usability Test, SUS*.

I. INTRODUCTION

The Ultima Infosys website is one of the sites that contain information system student papers. On this site, students can search for journals as references in helping with their final project or thesis. In addition, the Ultima Infosys site provides access to every student outside and inside the Universitas if the journals they make want to be included in the website as a collection of information system papers. The Universitas Multimedia Nusantara Information Systems Study Program, in collaboration with UMN Press, manages the Ultima Infosys website. Ultima InfoSys is also inseparable from how the service was designed, where users will feel comfortable using a website.

However, based on the User Experience Questionnaire (UEQ) that the researchers did previously, there were 20 student information system users; it was known that the Ultima InfoSys web was considered complicated to use and difficult or unclear in searching journals based on the results of the UEQ questionnaire.

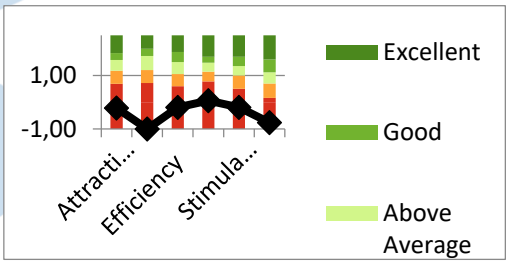


Fig. 1. UEQ Results Graph of 20 Information System students

From Fig. 1, The results of the 26 questions on the UEQ show that the Ultima InfoSys website, in terms of Attractiveness, Clarity, Efficiency, Accuracy, Stimulation, and Novelty, is still lacking. Therefore, the researcher chose the Ultima Infosys web as the object of research to evaluate it further by using Usability Testing and SUS as a method for measuring the website's usability. As well as providing recommendations for improvement in the form of a prototype to become a reference in future system development.

II. THEORY

1. *Evaluation*

According to the general description, evaluation is an activity to collect information about the performance of something (methods, people, equipment). The report will determine the best decision alternative [1].

2. *8 Golden Rules*

According to Ben Shneiderman in his book "Designing the User Interface", there are guidelines for designing a User Interface. These guidelines are referred to as the eight golden rules, which contain: [2]

1. *Strive for consistency*
   Consistency is required between application pages or between applications that are always connected. The goal is for users, especially beginners, to always see that the page they are viewing is still in scope or relevant to the application they are using.
2. *Cater to universal usability*
   The designer must consider the user's variations when designing an application interface. Both in terms of cultural and linguistic context and differences in how well users understand the app.
3. *Offer informative feedback*
   Informative feedback is not necessarily a response from the application to the user. Still, it can be in the form of a change in appearance every time the user acts so that the user understands that the action has been taken and answered by the application.
4. *Design dialogs to yield closure*
   This point is included in informative feedback; by saying that the process performed by the user has ended, the user understands that he does not need to wait if there will be another step after completing a cycle.
5. *Prevent errors*
   This is to prevent users from making mistakes during operation. This is necessary so that users don't get bored while using the application because they can't find the correct format/operation when trying the function.
6. *Permit easy reversal of actions*
   This point is quite important to support the user experience of an application. Usually, the back button is considered the achievement of this point.
7. *Support internal locus of control*
   This point is highly appreciated by users who are accustomed to using the application because, in general, they want a display that can be adjusted according to user preferences.
8. *Reduce short-term memory load*
   At this point, people tend to focus more on menu design and button layout. But in reality, it will be more effective if applied to the process when the user needs to provide input to the system.

3. *Website*

Websites are known as sites or portals. A website is a collection of interrelated web pages, the first page of a website, and each is independently called a web page [3].

4. *User Interface*

A user interface is a form of graphical display that is directly related to the user (user). The user interface connects the user with the operating system so the computer can be used. The design must be user-centered, meaning the user is highly involved in the design process. Therefore, there is an evaluation process carried out by the user on the design results [4].

5. *User Experience*

User experience (UX) is the experience that a website or software provides tools to make interactions exciting and fun. If the application had good usability in the past, it was enough. UX relates to users using or interacting with a product or service [5].

6. *Usability*

Usability is a measure of user experience interactivity related to a user interface, such as a site or software, in the form of an application. A system or software interface is said to be user-friendly if it is easy to learn [6] and helps the work and tasks of people who use it effectively and efficiently so that it is satisfying and attractive when used [7].

7. *Usability Testing*

Usability testing is testing the use of a system or product to find usability problems [8]. Based on the ISO 9421-11 standard, it is stated that the requirements for good usability are effectiveness, efficiency, and user satisfaction. Users should be able to perform effectively (based on the results), efficiently (based on the method), and be satisfied (get pleasure) [9].

8. *System Usability Scale*

John Brooke created the System Usability Scale (SUS) in 1986 to evaluate various systems or products practically. SUS was designed to address the need for simplicity and speed in assessing systems that have been created and can be used in multiple contexts and procedures other than websites, such as operating systems, hardware, software, and applications [10].

9. *Likert Scale*

The Likert scale is used as an evaluation scale because it provides an answer scale value for quantitative analysis. Likert can be evaluated as follows [11]:

1. Strongly Agree (SS) is given a score of 5
2. Agree (S) is given a score of 4
3. Neutral (N) scored 3
4. Disagree (TS) is given a score of 2
5. Strongly Disagree (STS) was given a score of 1

Survey research using a Likert scale is done as a questionnaire, multiple-choice questionnaire, or checklist [10].

III. METHODOLOGY

1. *Overview of Research Objects*

The general description of the object of research is a description that explains the situation and condition of the thing closely related to the investigation. In determining the object of research, prior observations were made to select the correct object in a study.

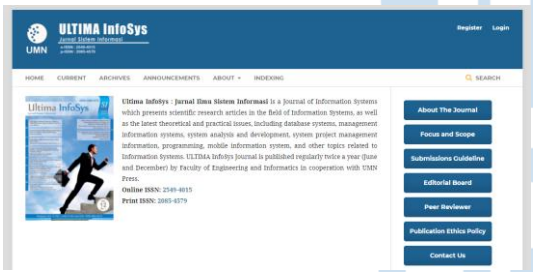


Fig. 2. Ultima InfoSys Website Display

The object of this research is the Ultima InfoSys website, Universitas Multimedia Nusantara. Ultima InfoSys provides access to search journals and to enter information systems journals that present scientific research articles in the field of information systems, as well as the latest theoretical and practical issues, including database systems, management information systems, system analysis, and development, project management information systems, programming, mobile information systems, and other topics related to information systems as shown in Fig. 2 above.

The factor that will be the focus of this research is usability, namely the extent to which the site can be used by the user comfortably and satisfactorily in terms of use based on the results of the questionnaire that the user will conduct.

2. *Research Method*

In conducting research, there is a path to solving the problem. The following is the distribution of the flowchart or research framework, as shown in Figure 3 below.

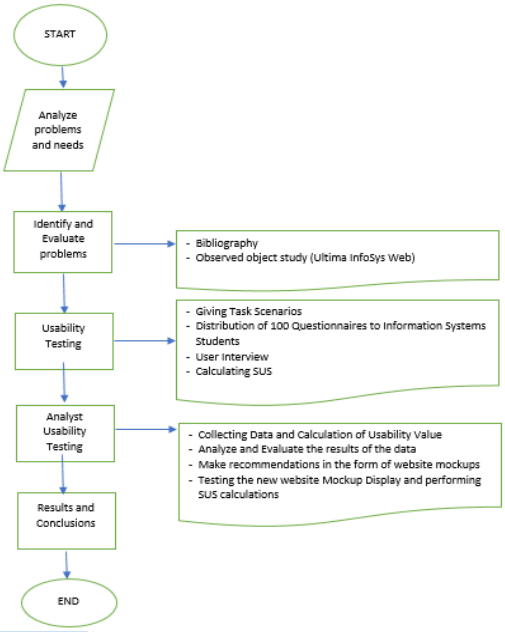


Fig. 3. Framework of Thinking

Through the research flow that has been made, there are four stages in solving problems, namely, the stage of analyzing problems and needs, the stage of identifying and evaluating problems, the usability testing stage, which is testing usability, the usability testing analysis stage, and the last stage is the conclusion and suggestion stage. A detailed explanation of the four stages is as follows:

1. Stage of Identifying and Evaluating Problems
2. Usability Testing Stage
3. Usability Testing Analysis Phase
4. Results and Conclusions

3. *Research Variables*

In this study, there are two variables, namely, the dependent variable and the independent variable.

1. The independent variable in this study is the Standard Usability Scale questionnaire. This study refers to the SUS Likert scale, each using a scale of 1-5 category answers. With the results of the SUS questionnaire, the average score for the SUS standardization of the application will be obtained.

2. The dependent variable in this study is the five components of Usability Testing (learnability, efficiency, memorability, error, and satisfaction). The results of usability testing influence the five components.

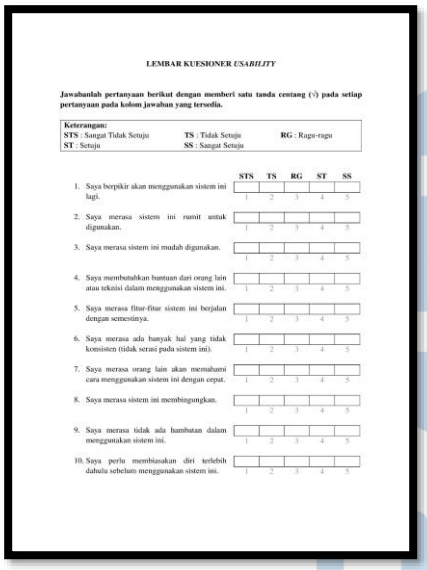
4. *Data Collection Techniques*

1. Interview Method

This study collected data from interviews with 20 UMN information system students through social media Lines. Interviews were conducted as a benchmark in research problems to find out experience on the Ultima InfoSys web.

2. Questionnaire Method

The SUS questionnaire was distributed to determine and measure the value of user satisfaction in using the Ultima InfoSys web. SUS is a standard benchmark of a questionnaire that measures user satisfaction in using the web or application. The SUS questionnaire consists of 10 different questions, as shown in Figure 4 below.



LEMBAR KUESIONER *USABILITY*

Jawabanlah pertanyaan berikut dengan memberi satu tanda centang (√) pada setiap pertanyaan pada kolom jawaban yang tersedia.

Keterangan:
STS : Sangat Tidak Setuju **TS** : Tidak Setuju **RG** : Ragu-ragu
ST : Setuju **SS** : Sangat Setuju

	STS	TS	RG	ST	SS
1. Saya berpikir akan menggunakan sistem ini lagi.	1	2	3	4	5
2. Saya merasa sistem ini rumit untuk digunakan.	1	2	3	4	5
3. Saya merasa sistem ini mudah digunakan.	1	2	3	4	5
4. Saya membutuhkan bantuan dari orang lain atau teknisi dalam menggunakan sistem ini.	1	2	3	4	5
5. Saya merasa fitur-fitur sistem ini berjalan dengan semestinya.	1	2	3	4	5
6. Saya merasa ada banyak hal yang tidak konsisten (tidak serasi pada sistem ini).	1	2	3	4	5
7. Saya merasa orang lain akan memahami cara menggunakan sistem ini dengan cepat.	1	2	3	4	5
8. Saya merasa sistem ini membingungkan.	1	2	3	4	5
9. Saya merasa tidak ada hambatan dalam menggunakan sistem ini.	1	2	3	4	5
10. Saya perlu membiasakan diri terlebih dahulu sebelum menggunakan sistem ini.	1	2	3	4	5

Fig. 4. SUS questionnaire

After collecting data from 20 respondents, the data is calculated by the following rules:

- For each odd-numbered question, the value of each question received from the user will be deducted by 1.
- For each question with an even number, the final score is obtained from 5 deductions from the question value obtained from the user.
- The SUS score is obtained from the sum of the scores for each question which is then multiplied by 2.5.
- The scoring rule applies to 1 respondent. For further calculations, the SUS score of each respondent is sought for the average score by adding up all scores and dividing by the number of respondents.

3. Usability Testing

Usability testing is done by instructing the respondent to conduct testing, which is done by introducing the respondent to perform several task scenarios that have been prepared. A usability test requires a task scenario. Task scenarios describe stories and contexts for why certain users or groups visit a website or application. [2].

Faulkner argues that five people will only find 55% of usability problems; to get 90% of usability problems, a minimum of 15 people is needed, and to get 95% of usability problems, a minimum of 20 users is required. [3]

This task is selected based on standard pages often opened on the Ultima InfoSys web. The subjects and parts that are evaluated in usability testing are:

- User reactions when entering the Ultima InfoSys web.
- View the Ultima InfoSys web UI display.
- See the features available on the Ultima InfoSys web.
- Login or Register to the Ultima InfoSys web account.

The measurement is seen from the success or failure of the user in carrying out the task scenario and the length of time in carrying out the task.

5. *Data Analysis Techniques*

The evaluation technique is a process of determining goals, design, implementation, and the desired impact, making decisions, supporting accountability, and providing information that can be used to increase understanding of the phenomenon.

1. Usability Evaluation

At this stage, the usability evaluation of the Ultima InfoSys website will be carried out. The review will be based on the results of a SUS questionnaire and usability testing carried out by 20 students assigned to perform task scenarios on the Ultima InfoSys website. This evaluation was carried out to determine what to do with the Ultima InfoSys web in terms of usability and user interface.

2. User Interface Improvement

After completing an assessment based on SUS on the Ultima InfoSys website, recommendations will be made. In recommending the user interface, it will be based on the problems faced by users or respondents when accessing the website. The issues contained on the website will fall into several different categories. The order of categorization is done by looking at the problems on the website

pages, such as the features on the website. Categorization can also be in color, language, layout, etc.

3. User Interface Test

This stage is carried out after completing the creation of new UI improvements. The following is in carrying out testing of the new UI.

- Testing the user interface by asking 20 students who had previously done usability testing to try to work on a task scenario on the new user interface.
- After that, the user will fill out the SUS questionnaire after trying the task scenario on the new UI.
- Then, the calculation is carried out again using SUS.

After the calculations, a comparison between the old UI and the new UI improvements is made.

IV. Result and Discussion

1. *Problem Identification*

After conducting the analysis and needs in the research, the next step is to identify the problem by conducting interviews with users and questionnaires.

1. Interview with users

Interviews were conducted with 20 information system students using Line's social media on 9-10 October 2021. Due to the current corona pandemic and the difficulty of meeting users for direct interviews, Line's social media was used to communicate. The results of the discussions found things that information system students usually do in accessing the Ultima InfoSys web:

- Log in to enter the journal (submission)
- Download the journal template
- Looking for journal reference sources for the thesis

2. Questionnaire

Usage satisfaction questionnaires were distributed using google forms through online media on 9 – 23 October 2021. Respondents who participated in filling out the questionnaires amounted to 100 respondents with specific criteria, namely UMN information system students. The questionnaire results distributed to student users of the UMN information system are used as benchmarks for usability evaluation and display based on the respondent's user experience on the Ultima InfoSys web.

2. *Analysis and Recommendations Display and Features*

To provide convenience in recommending user interface improvements, the Ultima InfoSys website was carried out with an analysis of the appearance and features of the Ultima InfoSys website. Analysis research based on the results of interviews with 20 students.

3. *Ultima InfoSys Homepage*

The picture on the right shows a display of the latest Ultima InfoSys web start page, created using Balsamiq mockup 3. The main features or usability of the Ultima InfoSys web are shown directly on the main page. That is where users can directly search for the journal they want to find. Make a search box that looks very clear and contains words in the form of action information, as shown in Figure 5 below.

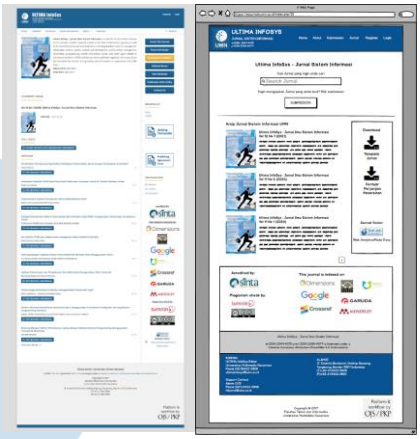


Fig. 5. Homepage Comparison

In addition, another prominent feature is journal submission. Make a submission button on the initial web page display because this feature is one of the main ones. This is to make it easier for users to directly connect to the submission page without having to bother looking for the submission page on the previous profile page. Then create a different layout from the previous one, with menus and essential features.

There is an information system archive display below the display where users can immediately see a collection of journal archives. On the right is a feature to download templates and forms and a feature to view users who access the Ultima InfoSys web. Then there is a footer under the archive view, which contains the institutions used by the Ultima InfoSys web. Under the display of the institution, there is writing in the form of information that this website has been licensed. Underneath it is a written report in the form of web contact and UMN address. And at the bottom, a copyright exists as in the previous view. The language used is Indonesian.

4. *Login Page*

Fig. 6. Login Page Comparison

In the picture on the right, there is a display of the latest Ultima InfoSys web login page. By creating a new layout, text and text input are centered on making it look neater and not leaving the display empty in the previous view, as shown in Figure 6 above.

5. *Register Page*

Fig. 7. Register Page Comparison

In the picture on the right, there is a display of the latest Ultima InfoSys web registration page. Creating a new layout to make it look neater and not leave an unobstructed view of the previous picture. There is also a feature on the right, a button for submissions, to make it easier for users to submit. Then select the critical data and use a language that the user understands. In general, the register display that has been created looks like a standard register display, as shown in Figure 7 above.

6. *Search Page*

Fig. 8. Search Page Comparison

In the picture on the right, there is a display of the latest Ultima InfoSys web search page. By creating new layouts that are easier for users. Such as the layout of the search box that is visible coupled with the information words of action. There is an additional filter feature to search for journals by searching for journals by category. And also improved the filter to search for journals by year to make it easier and less complicated than the previous filter, which used the published after and published before filters. The journals are produced in boxes to make them look neater than the previous display, as shown in Figure 8 above.

7. *Submission Page*

Fig. 9. New Submission Page

In fig.9, there is a display of the latest Ultima InfoSys web submission page. By making it as simple as possible to make it easier for users to carry out journal submission activities. There are writings and terms and writings in red indicating that this information is critical to the user. The user must fill in the checkbox that the user must check as one of the conditions to fill in the journal data. If the conditions are limited, the user can fill in further data, such as article components, titles, and abstracts. Then, create a journal upload button for uploading. Underneath is a comment field that users can write if something is to be conveyed. After that, there is a submit button at the very bottom of the end.

8. *Jurnal Page*

Fig. 10. New Jurnal Page

In fig.10, there is a display of the latest Ultima InfoSys web journal page that has been created. The menu and journal pages were added because previously, there was no menu containing journal collections. There are only a few recent journals. Because the primary use of this web is to search for journals and make submissions to enter periodicals, this journal page was created to make it easier to view a collection of journals, and users do not need to use search to search. This page is more or less the same as the search page, but what distinguishes it is the collection of journals that existed before the search was carried out.

9. *The Results of the Ultima InfoSys Web Usability Testing Analysis*

TABLE I. Table of Responses to the Main Page

Category Web	Web Ultima InfoSys
Appearance	• **Unattractive appearance** Reason: There are only a lot of posts and menu features. • **Simple display** Reason: The primary reaction when viewing this website is that it is straightforward and user-friendly, but some features or options are complex. •**Confusing** Reason: The display is too simple, so finding the journal is confusing and complicated. And there is no option on the main page that goes directly to submission.
Layout	• **Unattractive design** Reason: The design is too ordinary and plain. It should be given more pictures. • **Less Layout** Reason: The search button doesn't show enough to be able to search for journals. • **Added Submission Menu** Reason: To make it easier for users to submit journals. • **Added a Menu to view a collection of Journals** Reason: To make it easier to find journals if we don't use the search box.
Information Presentation	• **Difficult to find information on what to do on the Ultima InfoSys web** Reason: The initial appearance is very confusing because only articles or writings tell you this is an information system journal website, even though we can search for journals and submit journals.
User Convenience	• **Difficult to use** Reason: Confused about submitting and looking for journals •**Neutral** Reason: Directly or visible, it feels comfortable and user-friendly. But some make users uncomfortable without features that make it easier to use the web, such as searching for journals and journal submissions. • **Less user friendly** Reason: Less user-friendly when searching for journals in the search box because there is only a filter feature based on author and publish date.
Language Usage	• **Made in the Indonesian Language** Reason: The language on the Ultima InfoSys web uses English, and there is no option to change the language to Indonesian. Therefore, users who do not understand English well challenging difficult to understand and are confused with the features available on the Ultima InfoSys web.

Based on the summary taken from the respondents and entered into the table, many respondents find it challenging to use the Ultima InfoSys web because many features or options are not on the main page,

which will make it easier for users to search or submit. Respondents feel comfortable and less comfortable using the website because they see a simple but not user-friendly interface. Based on the use of language used only in English makes it difficult for users who do not understand English to understand the features on the web. Therefore, the Ultima InfoSys website must develop in terms of appearance, improve features or options to make it easier for users, and create a website using Indonesian or make two language choices, Indonesian and English.

10. *Results of SUS Questionnaire Analysis (Before-After)*

Testing the analysis using the System Usability Scale (SUS) method. According to Laura Faulkner's theory, to get 95% of the problems, 20 users are needed. Then 20 respondents were taken from information system students from 100 respondents who had filled out the questionnaire and had used the Ultima InfoSys web.[12] Ten questions were given in the questionnaire, consisting of 5 positive and five negative questions. And with the selection of 5 answers using a Likert scale, namely, strongly disagree, disagree, neutral, agree, strongly agree. The following ten questions were given:

1. I will often use the Ultima InfoSys web.
2. I found many difficulties in accessing the Ultima InfoSys web.
3. The Ultima InfoSys web is easy to use.
4. I need help from technical/other people when using the Ultima InfoSys web.
5. I found that various functions in the Ultima InfoSys web were well integrated.
6. I think there are too many discrepancies in the Ultima InfoSys web.
7. I feel that students will find it easy to learn the Ultima InfoSys web very quickly.
8. I find the Ultima InfoSys web very complicated to use.
9. I feel there are no obstacles when using the Ultima InfoSys web.
10. I need to learn many things before I can use the Ultima InfoSys web.

TABLE II. Calculation of SUS before a recommendation

	Skor Hasil Hitung (Data Contoh)										Jumlah	Nilai
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		(Jumlah x 2.5)
R1	2	2	3	1	4	2	2	2	2	0	20	50
R2	2	2	2	1	4	1	2	2	2	0	18	45
R3	2	1	2	2	2	2	2	1	2	0	16	40
R4	2	3	3	1	3	2	2	2	3	0	21	52,5
R5	2	2	1	1	3	2	2	3	1	1	18	45
R6	2	1	1	2	3	2	3	2	2	2	20	50
R7	1	1	2	2	4	2	2	2	2	1	19	47,5
R8	2	2	3	2	4	2	3	1	1	2	22	55
R9	3	2	2	2	4	1	2	2	4	2	24	60
R10	2	2	3	2	2	2	2	2	2	2	21	52,5
R11	2	2	1	1	1	1	2	3	2	1	16	40
R12	1	3	1	1	2	2	3	2	2	0	17	42,5
R13	1	2	2	1	2	2	3	3	2	1	19	47,5
R14	0	1	2	2	4	2	2	3	2	1	19	47,5
R15	2	1	2	2	3	1	3	3	2	2	21	52,5
R16	2	2	2	1	3	1	3	3	2	2	21	52,5
R17	2	2	3	2	3	2	3	4	4	2	27	67,5
R18	1	2	3	1	3	2	3	3	2	2	22	55
R19	1	1	3	1	3	2	3	2	2	2	20	50
R20	1	2	2	0	3	2	3	3	2	3	21	52,5
	Skor Rata-rata (Hasil Akhir)											50,25

Table II shows that the score for the questionnaire after usability testing is 50.25 with a rating of 'ok', and it is still in the below-average category because, according to Jeff Sauro's research, the average SUS score is 68, as seen in Table II in the SUS assessment. This means that the score obtained by the current version of the Ultima InfoSys web is below the global average SUS score, so the usability value cannot be said to have met the usability standard.

TABLE III. Calculation of SUS after a recommendation

	Skor Hasil Hitung (Data Contoh)										Jumlah	Nilai
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		(Jumlah x 2.5)
R1	2	4	4	4	4	4	4	3	3	36	90	
R2	2	4	3	3	4	4	4	3	2	4	33	82,5
R3	2	3	4	4	4	3	4	3	2	3	32	80
R4	2	4	4	4	4	4	4	4	3	4	37	92,5
R5	2	4	4	4	4	4	4	4	3	3	36	90
R6	2	3	4	4	3	3	4	2	3	3	31	77,5
R7	3	3	3	3	4	2	4	3	3	4	32	80
R8	3	3	3	3	4	3	3	3	3	2	30	75
R9	3	4	4	4	4	3	4	4	4	3	37	92,5
R10	2	3	3	4	4	2	3	4	2	3	30	75
R11	2	4	4	4	4	4	4	3	3	2	34	85
R12	2	3	3	4	3	3	4	2	3	3	30	75
R13	2	3	3	3	3	3	3	4	3	3	30	75
R14	3	4	3	4	4	2	3	3	4	2	32	80
R15	2	3	3	4	3	3	3	3	3	3	30	75
R16	2	3	4	4	3	2	3	3	4	3	31	77,5
R17	2	4	3	4	4	3	4	4	3	2	33	82,5
R18	3	3	3	4	4	3	4	3	3	2	32	80
R19	2	4	4	3	4	4	3	4	3	3	34	85
R20	2	4	4	4	5	3	3	3	3	2	33	82,5
	Skor Rata-rata (Hasil Akhir)											81,625

The value obtained from the results of the usability testing questionnaire on the recommendation mockup that has been made gets a value of 81,625, which shows that the mockup has entered the SUS standard, according to Jeff Sauro's research, which is where the SUS standard is 68. The recommended mockup is above average, ranks well, and is acceptable to users.

V. CONCLUSION

Based on the evaluation that has been done, a mockup of recommendations for the Ultima InfoSys website is made. The results of responses from respondents for mockup recommendations get better answers than the current Ultima InfoSys web display. The mockup score was 81,265, which means that the recommended mockup that has been made is liked by users and is better than the current Ultima InfoSys web view. Suggestions for the future are that an evaluation can be carried out on the Ultima InfoSys web, which is carried out by the development team. This is to improve the website's quality, get users' comfort, and improve the web's appearance.

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