

Usability Evaluation on Website E-Fishery using Heuristic Evaluation

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ABSTRACT

PT. Multidaya Teknologi Nusantara is a company that produces technology that can automatically feed fish which can be monitored through the eFishery website. A website must include aspects in order to maintain the information available in it and the quality of use. Problems that are often encountered in a website are usability problems which result in users often being mistaken for an inappropriate interface. Since it was founded in 2013, there has never been a usability evaluation of the eFishery website so it is not known whether this website is in accordance with what the community needs or not. Based on these problems, usability assessment needs to be carried out using a heuristic method on the efishery.com website based on suggestions and criticisms from several evaluators who are experts in the field of web programming, UI/UX. The goal is to find out problems with usability on the efishery.com website and as a consideration for the efishery.com website development team for further improvements to suit user needs. This study focuses on the usability assessment of the efishery.com website along with recommended solutions. The method used in this research is Heuristic which involves three experienced experts as evaluators to assess the efishery.com website. From the results of this study, it was found that the problem with the highest percentage was on the principle of esthetics and Minimalist Design with the heuristic code H7 was 46% while the lowest percentage was in the code H2, H3, H4 and H5 of 0%, so it does not have to be repaired.

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1. INTRODUCTION

Rapid technological developments make it easier for humans to work and increase production efficiency in various fields such as aquaculture, telecommunications, industry and so on (Amarudin et al., 2020)(R. Setiawan, 2020). PT. Multidaya Teknologi Nusantara is a company that has succeeded in developing technology in the field of fisheries by producing eFishery technology (Handayani, 2017). The advantage of this technology that it is able to feed fish automatically according to the selected dose and time. In addition, this tool can also monitor pond water quality through the eFishery website. (Prihatini, 2019).

One of the things that need to be considered when creating a website is the interface design of the website must be easy to use by the average person (Oktafina et al., 2021). User experience when using a product or system has an important role in its development (Prakasa and Ardiansyah, 2018). The quality of a website can be judged from the user experience which includes the usability, convenience, comfort and satisfaction of the website users (Ahsyar & Afani, 2019).

To find out whether a website is suitable for use or not, usability evaluation is needed to identify usability problems that will make the system better than before, fit for purpose, effective, efficient, and achieve user satisfaction (D. Setiawan & Rafianto, 2020). One such evaluation method is Heuristic Evaluation (HE). According to Jeffries, Nielsen, and Ssemugabi, in (Ahsyar & Afani, 2019) the advantage of this heuristic evaluation is that many people use this method to assess the level of user comfort, easily detect usability problems, are relatively inexpensive and offer great benefits and large data. found to be more appropriate because it is carried out by evaluators who are experts in the usability field.

However, since it was founded in 2013, there has never been an assessment of the usability or usability of the eFishery website so it is not known whether this website is in accordance with what the community needs or not. Based on these problems, so that the eFishery website can be easily accepted and used by fishermen and users, it is necessary to evaluate usability with a heuristic method on the eFishery website based on suggestions and criticisms from several evaluators who are experts in the field of web programming, UI/UX. The purpose of the usability evaluation of the eFishery website is to find usability problems on the eFishery website and as a consideration for the eFishery website development team for further improvements to suit user needs. The researcher uses the heuristic method so that it involves three evaluators in their evaluation activities. Then the results will be categorized against usability problems and the percentage calculated. Furthermore, improvements will be made to the appearance of the eFishery website which is more effective and efficient based on the evaluation results that have been previously analyzed by designing or prototyping the website using the figma application.

2. RESEARCH METHOD

In this study, researchers used the Heuristic Evaluation method to evaluate usability on the eFishery website (Ahsyar & Afani, 2019). The initial stage in this research is planning and literature study to obtain the required data and references, then proceed with the core stage of this research, namely data collection and analysis using the Heuristic method to provide an overview of the assessment and provide solutions from the evaluation results (Rahman et al., 2020).

After the initial stages have been carried out, the next step is to carry out the main processes in this research, namely:

1. Problem Identification

The first stage is to determine in advance the variables from the heuristic principles according to Nielsen and Molich's opinion, there are 10 heuristic principles, but in this study it is limited to only determining the identification of variables based on 8 heuristic principles because it adapts to usability problems on the website under study. In order to facilitate the analysis process, the researcher will code the eight principles starting from H1 to H8, (Kurniawan, 2018).

2. Problem Classification

In the second stage, researchers will find problems related to usability based on the results of heuristic evaluations from experts. Then the problems will be summarized and categorized into tables.

This study involved 3 evaluators consisting of 1 evaluator who is the CEO of sundaweb.co.id, a site that provides website creation services, applications, digital products and blogs, then there are 2 evaluators who are ICT teachers at MAN 2 Cilegon who have experience in designing school website. The reason the researcher chose the three evaluators was because they were skilled in making judgments with heuristic evaluations (Agarina et al., 2019).

The evaluation procedure carried out in this study is based on the procedure and flow diagram in the image below.

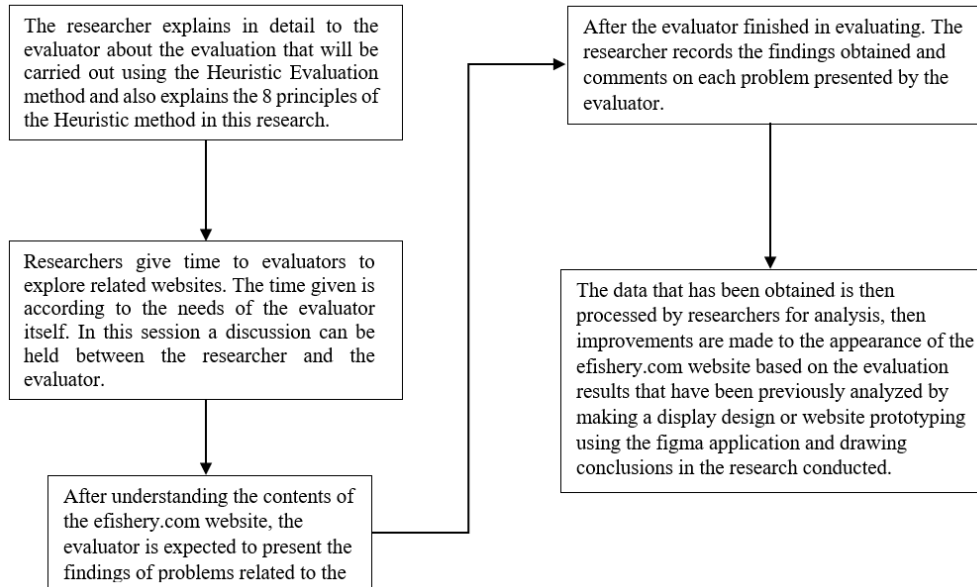


Figure 1. Flowchart of heuristic evaluation procedures by experts

A list of usability problems on the eFishery website that has been obtained by experts can be found in the results and discussion chapter in Table 2. Categories of usability problems

3. Calculation of Usability Problems

In the third step, a heuristic problem is classified and then the ratio of each heuristic principle is calculated. At this stage, the heuristic principles that are evaluated the most by evaluators can be known along with their respective magnitudes (Ahssyar and Afni, 2019).

4. Nielsen Model Comparison

In this fourth step, the categories of problems that have been found previously, are compared with the Nielsen model to show that this research is appropriate or not. The calculations at this stage are based on research conducted by Rif'ah et al. (2016).

5. Evaluator Combination Percentage

After knowing the results of the evaluator combination, then the percentage and average calculation of the number of heuristic principles in each category is carried out (Ahssyar, 2019). The calculation of the percentage of the number of usability problems obtained can be observed in Table 5.

6. Recommended Solution

In this step, identify references from the results obtained in the form of suggestions for each problem contained on the efishery.com website. After obtaining a solution, the next step is to create a user interface design in Figma based on the evaluation results that have been analyzed previously. The researcher hopes that this solution recommendation can be used as consideration for developing a website in order to improve weaknesses related to usability.

3. RESULTS AND DISCUSSIONS

3.1 Problem Identification

According to Nielsen and Molich, there are 10 heuristic principles, but in this study only determine the identification of variables based on 8 heuristic principles, namely: (1) visibility of system status; (2) match between system and the real world; (3) use control and freedom; (4) consistency and standards; (5) recognition rather than recall; (6) flexibility and efficiency of use; (7) aesthetic and minimalist design; (8) help user recognize, dialogue, and recovers from errors. In order to facilitate the analysis process, the researcher will code the eight principles starting from H1 to H8 in Table 1.

There are three columns in table 1, including the Code, Heuristic, and Description columns. In the code column there is a code from H1 to H8 to indicate the eight heuristic principles that are in

accordance with the number of heuristic principles studied. Then the heuristic column is the heuristic principles according to Nielsen and Molich (1995), and the description column is to describe each heuristic principle.

Table 1. Heuristic code

Kode	Heuristic	Information
H1	Visibility of System Status	The system must always provide information to the user about the current situation through good messages and in a short time (Rahman et al., 2020).
H2	Match Between System and The Real World	Use the user's language. The dialogue uses language that is easily understood by the user, is not ambiguous, is not abbreviated and uses good grammar (Pawlowski et al., 2021).
H3	Use Control and Freedom	Users should be able to freely choose and perform work (as needed) and easy to cancel an operation. To prevent user errors, the system needs to create a menu for undo or redo. Ease of navigation (Indrayani et al. 2020).
H4	Consistency and Standards	Consistency of the interface on the system according to standards, avoiding users from feeling hesitant when using a command or function for the first time (Sudiarsa & Wiraditya, 2020).
H5	Recognition Rather than Recall	Use clear language, symbols and pictures. There is an error message. Interface components on the system that are easily recognized by the user and minimize the user to recall (Handayani, 2017).
H6	Flexibility and Efficient of Use	Create a system that accommodates experienced users and novice users. The system is efficient and flexible, making it fast and easy for users to perform tasks (Ahsyar and Afani, 2019).
H7	Aesthetic and Minimalist Design	The information displayed is relevant. A dialogue must not contain irrelevant and unnecessary content or information. Each component must contain meaning and function in accordance with the needs of the system. Aesthetic design, does not interfere with users when using the system (Ahsyar and Afani, 2019).
H8	Help Users Recognize, Dialogue, and Recovers From Errors	Instructions and information on the system must be easily accessible and clearly visible when needed. The system makes it easy for users to recognize, diagnose, and get out of errors. Error messages in simple language, easy to understand and provide solutions to users (Langevin et al., 2021).

3.2 Problem Classification

After evaluating usability on the eFishery website. using the heuristic method by pre-determined evaluators, there are 12 problems related to usability on the eFishery website. Table 2 below is a list of usability problems that were obtained based on the results of the assessment in accordance with the Guideline Heuristic Evaluation by the evaluators. Then, each of these problems is adjusted to the pre-existing heuristic code.

Table 2. Categories of usability problems

No.	Usability Problems	Evaluators	Heuristic Code
1.	The menu is active, but don't make it white, but green to make it visible.	1	H7
2.	Add a blog / news menu either on the front end or on the back end: so that the site is helped from the SEO side.	1	H6
3.	On the job page, the category tab menu looks untidy.	1	H7
4.	On the "product" menu, if really want to create a sub menu, don't make the product active, just leave it blank.	1	H7
5.	On the fish cultivator solutions page, the design looks less neat.	1	H7
6.	The data search process in the data search function is quite slow to search for data.	2	H6
7.	The system does not explicitly inform the user's presence in the menu.	2	H1
8.	eFishery has a design that is too full of information, it can saturate the user.	2	H7
9.	Wiget looks messy. Because it uses Align Left.	2	H8
10.	The system takes a long time (about a minute) to get the desired information. For example, the process of opening the eFishery page and the process of the data search function.	3	H6
11.	On the Contact Us menu there is an address but the map instructions are error and cannot be opened.	3	H8
12.	There are no ratings from other buyers on the order.	3	H6

3.3 Calculation of Usability Problems

After sorting out several problems, the next step is to calculate the ratio of each heuristic principle from Table 2 above, as shown in Table 3 below regarding the calculation of the problem.

Table 3. Calculation of usability problems

Heuristic Code	Heuristic	Evaluators	Frequency Percentage	Cumulative Percentage
H1	Visibility of System Status	1	8%	8%
H2	Match Between System and The Real World	0	0	8%
H3	Use Control and Freedom	0	0	8%
H4	Consistency and Standards	0	0	8%
H5	Recognition Rather than Recall	0	0	8%
H6	Flexibility and Efficient of Use	4	33%	41%
H7	Aesthetic and Minimalist Design	5	42%	83%
H8	Help Users Recognize, Dialogue, and Recovers From Errors	2	17%	100%
Jumlah		12	100%	

Based on the calculations in the table above, it can be seen that the category of usability problems that are most widely reviewed by experts is the heuristic code H7 with a ratio of 42% of the total 12 problems found. The second highest ratio is H6 with a ratio of 36%.

3.4 Comparison of Nielsen Models (1992)

At this stage a comparison is made with the Nielsen (1992) model to show whether it is appropriate or not as shown in table 4. Therefore, it is necessary to determine the identification of the heuristics found in each group of the number of evaluators. Voters consisted of 3 groups, where in each group a combination of respondents was randomly selected 3 times in each group. The results of the identification of heuristic determination can be seen in Table 4. Then the average number of heuristics in each category is calculated, as shown in Table 5 (Rifah et al. 2016).

Table 4. Number of categories for each group

No	Evaluators	Heuristic	Number of Heuristics
1	3	H6, H8	2
	1	H6, H7	2
	2	H1, H6, H7, H8	4
2	1, 3	H6, H7, H8	3
	2, 1	H1, H6, H7, H8	4
	3, 2	H1, H6, H7, H8	4
3	1, 2, 3	H1, H6, H7, H8	4

3.5 Evaluator Combination Percentage

After comparing the Nielsen model and knowing the results of the combination of evaluators, then calculating the percentage and average of the number of heuristic principles in each category. The results of the calculation of the percent usability problem can be seen in Table 5. To see a comparison of the Nielsen model in graphical form, you can see it in Figure 2. Based on Figure 2 it can be seen that this study follows the Nielsen model. This is evidenced by the percentage of heuristic scores that increase proportionally to the number of included reviewers. Evaluators tend to evaluate principles with similar results. This shows that the Heuristic method can involve three expert evaluators to identify usability problems.

Table 5. Evaluator Combination Percentage

Number of Evaluators	Average Heuristic	Percentage Heuristic
1	3	75%
2	4	100%
3	4	100%

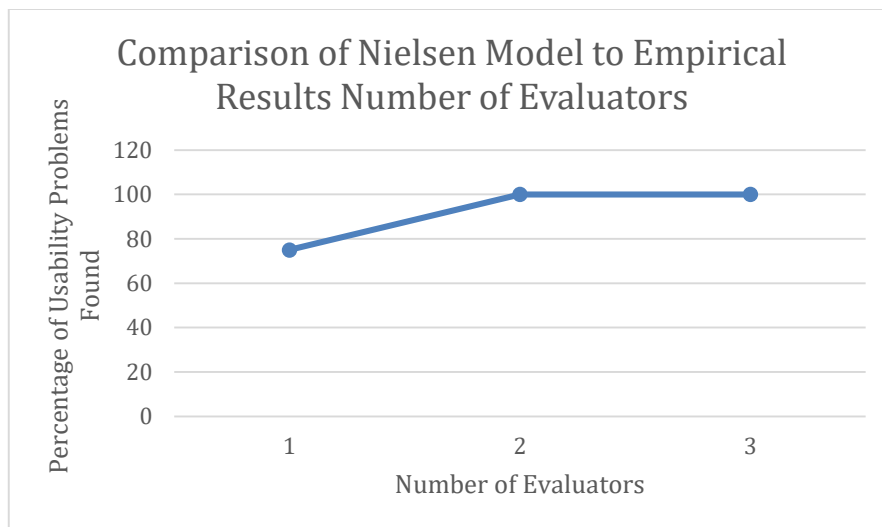


Figure 2. Comparison of the Number of Problems in Nielsen's Heuristic Model (1992) with Empirical Results

3.6 Recommended Solution

Based on the results of the evaluation that has been carried out by the evaluator using the Heuristic Evaluation method, further improvements will be made so that the appearance of the eFishery website is more efficient and effective in designing or prototyping a website with a reference-based figma application from the Eight Golden Rules Theory by Ben Sheiderman and Chaterine Plaisant (Indrayani et al. 2020).

The top problem in this research is the H7 code for aesthetic and minimalist design principles with a percentage of 42%. Based on these results, the following is an explanation of the problem along with the solutions suggested by the evaluators:

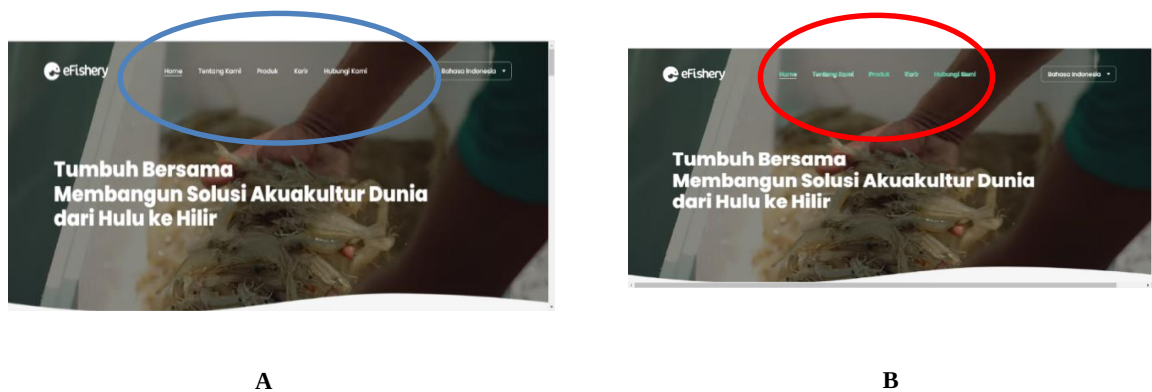


Figure 3. eFishery Website Initial Menu Display

Figure A shows the initial menu of the eFishery Website before taking the screen upgrade step, in Figure B it has been carried out according to user recommendations from the results of the evaluator regarding the Aesthetic and Minimalist Design aspect, namely the active menu, but not white, but green so it can be seen.

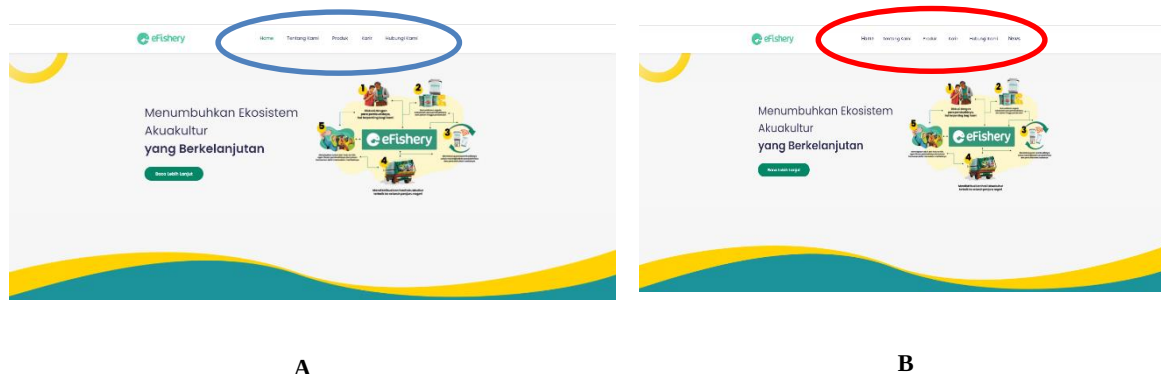


Figure 4. eFishery Website Initial Menu Display

Figure A shows the initial menu of the eFishery Website before taking the screen upgrade step, in Figure B it has been carried out according to user recommendations from the results of the evaluator regarding aspects of Flexibility and Efficient of Use, namely adding a blog / news menu either on the front end or on the back end: so that the site is helped from SEO side.

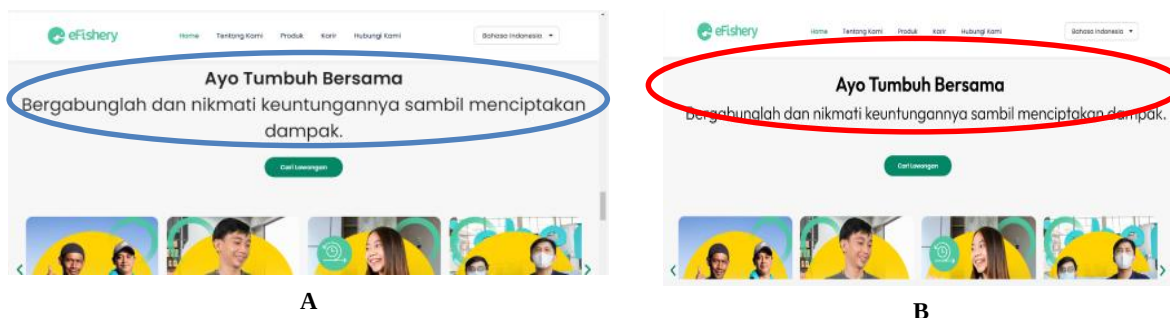


Figure 5. Display Menu tab on job page

Figure A displays the tab menu on the vacancy page before taking steps to improve the appearance, while in Figure B it is displayed according to the user's recommendations from the results of the evaluator on the Aesthetic and Minimalist Design aspect, namely On the job page, the category tab menu looks less tidy.

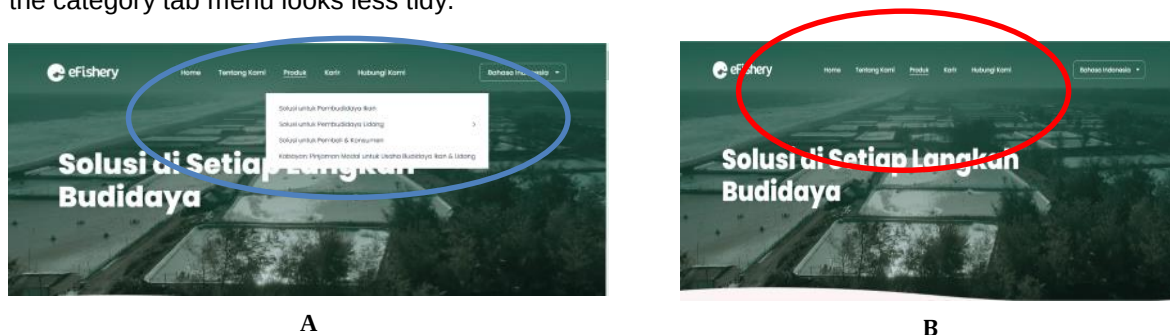


Figure 6. Product Home Menu Display

Figure A shows the start of the product menu before the screen repair step is carried out, while in Figure B the screen display is made according to the user's recommendations from the results of the evaluator in terms of the Aesthetic and Minimalist Design aspect, namely on the "product" menu, if you really want to create a sub menu, don't use the product. made active, just leave it blank

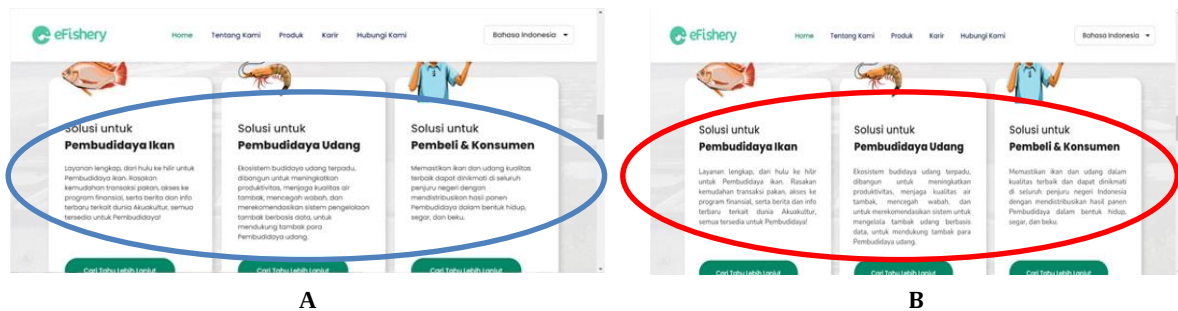


Figure 7. Display Menu Home part of our solution for the world of Aquaculture

Figure A shows the home menu of our solution for the world of aquaculture before taking steps to improve the display screen, meanwhile, in Figure B, the display has been improved based on the evaluator's recommendations on the Help Users Recognize, Dialogue, and Recovers From Errors aspect, namely the article looks untidy because it uses left alignment then changed to right and left alignment (Justify).

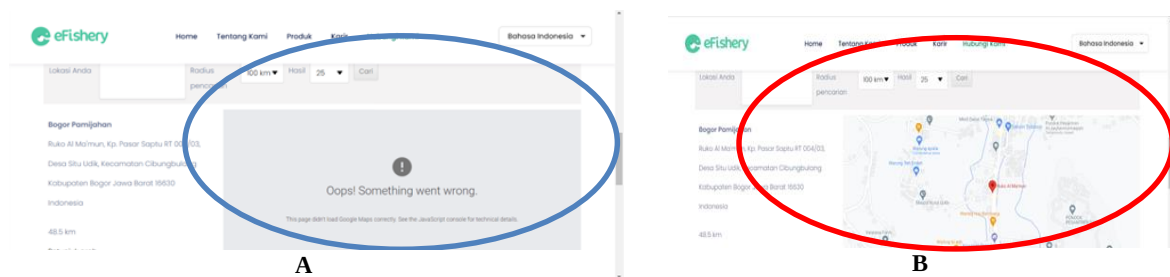


Figure 8. Menu display contact us

Picture A shows the contact us menu before taking the temporary display improvement step, in picture B the display has been improved based on the evaluator's recommendations for the Help Users Recognize, Dialogue, and Recovers From Errors aspect, namely the Contact Us menu has an address but the map instructions are error and cannot be opened.

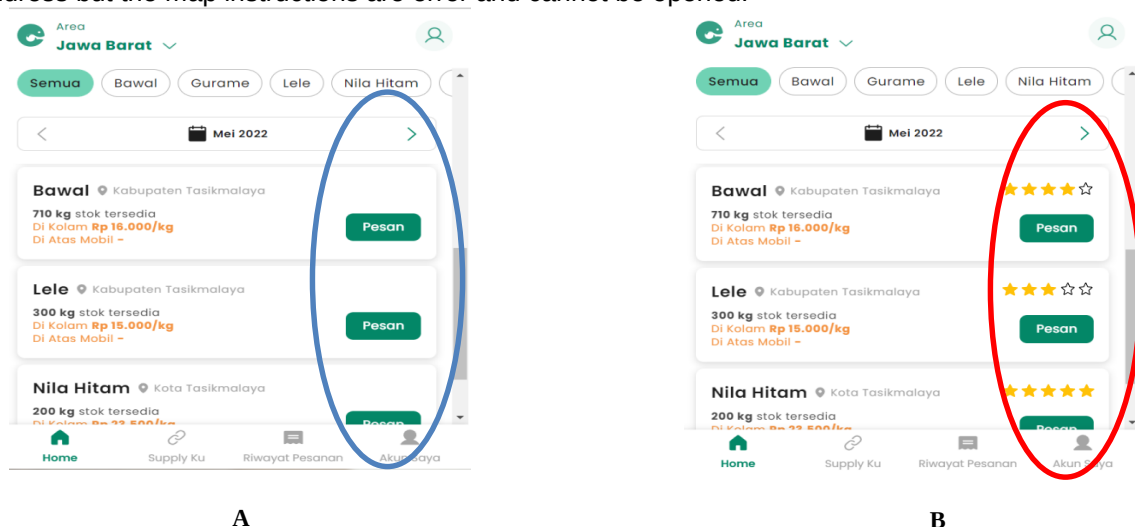


Figure 9. Order menu display

Figure A shows the ordering menu before the improvement step is taken on the temporary display screen, in Figure B the display has been improved based on the recommendations of the evaluators on the Flexibility and Efficient of Use aspect, namely there is no assessment from other buyers on the order.

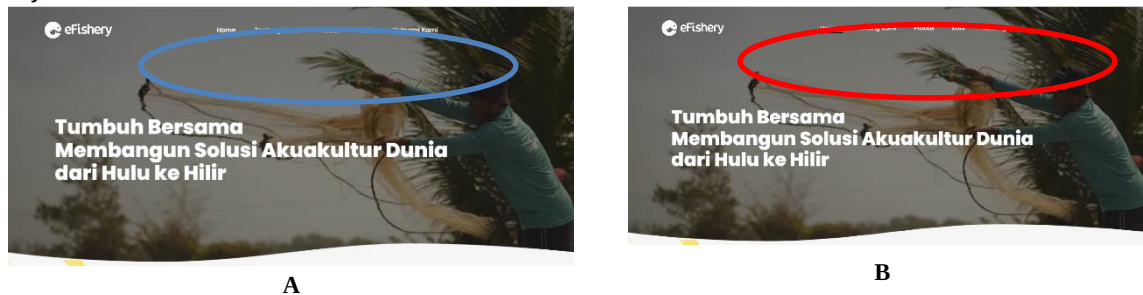


Figure 10. Efishery website Home Menu Display

Figure A is the initial menu display of the eFishery Website before the temporary display is increased, in Figure B the display has been improved based on the evaluator's recommendations on the Visibility of System Status aspect, namely when informing the existence of a system is not clear because it is on a menu.

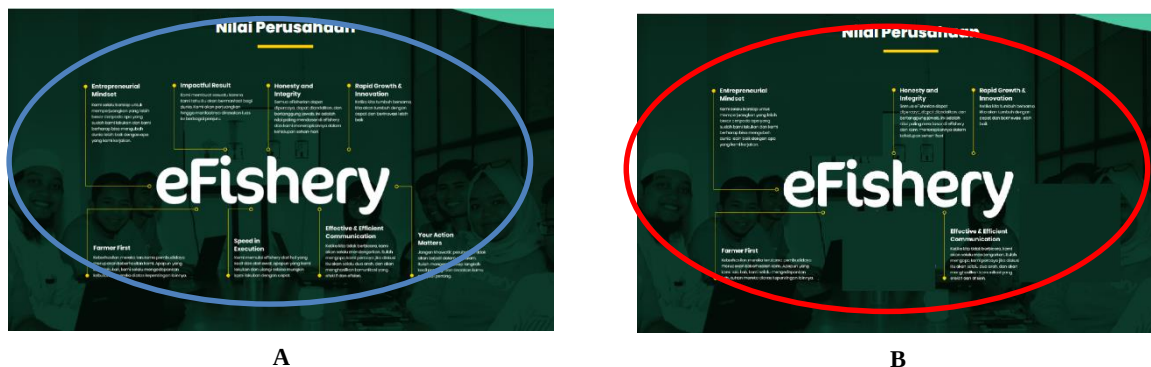


Figure 11. Menu display about us company value section

Figure A shows a menu about us in the company's value section before taking steps to improve the appearance, meanwhile, in Figure B the display has been improved based on the evaluator's recommendations regarding the aesthetic and Minimalist Design aspect, namely eFishery has a design that is too full of information.

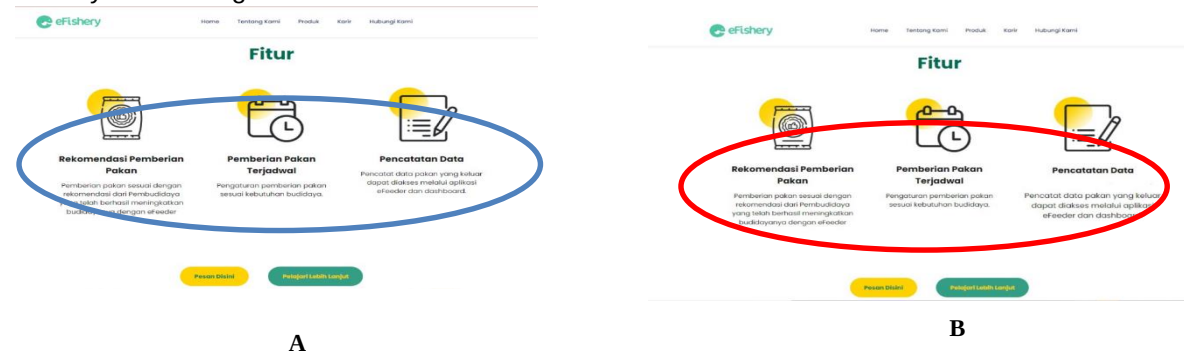


Figure 12. Display menu page fish cultivator solutions

Figure A shows the menu of the fish cultivator's solution page before taking steps to improve the temporary display, in Figure B the display has been improved based on the evaluator's recommendations regarding the esthetic and Minimalist Design aspect, namely on the fish cultivator's solution page, the design looks less tidy.

4. CONCLUSION

Based on the results of the evaluation using the heuristic method by 3 evaluators, there are as many as 12 problems related to usability on the eFishery web which can be concluded that: (1) The usability problem has been successfully resolved by establishing a heuristic method for evaluation on the eFishery website. Based on the results of calculations that have been carried out, the highest percentage found in the principles of minimalist and aesthetic design with the heuristic code H7 is 46%. It should be corrected immediately according to the solution recommended by the reviewer. The lowest tariff is in principle to help users identify, communicate, and correct errors in the H2, H3, H4 and H5 codes of 0%, which is not an obligation for the company to be corrected because these numbers are not the main focus to be corrected; (2) According to the evaluation results, code H7 with a problem frequency of five is prioritized for repair.

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