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Application of Moderated Remote Usability Testing Method on Agrovest Website

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A B S T R A C T	**A R T I C L E I N F O**
This article is intended to improve the user experience on the Agrovest website, with the aim that users continue to use the site and website developers do not miss out on revenue opportunities from existing sources. Agrovest is a platform that provides information about agriculture, from plant types to fertilization. The site comes with various features, such as information about crops and fertilizers, fertilizer calculators, as well as chat rooms. The method used in this study is moderated remote usability testing which is one method of usability testing. The results of the research study revealed that (1) there were 16 findings, consisting of two positive findings, eight neutral findings and six negative findings on Agrovest features (2) the need to improve the Agrovest website to improve user experience. This study also provides recommendations for improving the Agrovest website based on the results of moderated remote usability testing conducted on five participants.	

1. INTRODUCTION

The definition of usability is a measure used to determine how effectively users can access the functionality of a system. Usability serves as a quality measure of the user experience when interacting with a product or system, whether it is a website, software application, mobile technology, or other user-operated devices (Nielsen, 2012). Usability is defined as the ability of users to use a product to successfully perform specific tasks accurately and quickly, and it is considered an important concept for evaluating system adoption, where satisfaction plays the most crucial role (A. Generosi,2022). Usability testing is actually more about the method used to assess the user experience of existing products (Nathaniel, 2023). There are ten techniques in the usability testing method that can be used to conduct usability testing evaluations, including: Thinking-Aloud Protocol, Shadowing Method, Co-Discovery Learning, Coaching Method, Question-Asking Protocol, Teaching Method, Retrospective Testing, Performance Measurement, Remote Testing, and Eye Tracking(Wedayanti, 2019).

Based on the testing location, usability testing can also be conducted in two ways: in-person usability testing and remote usability testing (Moran, 2019). Remote usability testing is divided into two types: moderated and unmoderated usability testing. In this study, moderated usability testing is used as the usability evaluation method, where test evaluators are separated in space and/or time from the test subjects and accompanied by a moderator. Remote usability testing has several advantages over laboratory testing. One of them is cost savings, which include reduced travel costs for test participants, laboratory room rental costs, and the ability to access a larger sample size. In other words, through remote testing, it is possible to reduce the costs usually associated with testing in a laboratory environment (Alhadreti, 2022). Moderated remote usability testing involves a remote meeting between the researcher and the participants in a virtual space (KhayyatKhoshnevis, 2022). The process of evaluating UX using moderated remote usability testing shows significant difference in user completionrates.

Websites are information services capable of handling requests from many users effectively (Yumarlin, dkk., 2016). It contains interconnected topics, sometimes accompanied by files such as images, videos, or other documents (Ulum, 2018). In the current digital era, the need for easily accessible and efficient information is increasing. Therefore, a website should be designed in such a way that it can handle high user traffic without experiencing performance degradation. Every website is also expected to provide the necessary information to users so that they can access data quickly and stay updated (Hartawan, 2019). Features on a website should ideally be designed and equipped while considering user needs. This aims to facilitate users in accessing information, accelerate the data search process, and ensure the accuracy of the information received (Wahyudin,2020).

Agrovest is one of the agricultural websites that assists users in obtaining information about crops and fertilizers more easily and making accurate fertilizer measurements through the fertilizer calculator feature available on the website. As a widely used service by users, Agrovest should be able to interact with consumers. To create a good product or service, it is crucial to ensure that the product and service provide a good user experience (Schrepp, dkk., 2014). A website should have a user interface that captures

attention without disturbing the user's vision and meets users' desires. User experience represents the interaction that occurs between users and the product, service, and company providing the product (Norman, 2016). Therefore, Agrovest needs to conduct user experience evaluation on the usability of the website to determine the extent of the quality of the site's appearance and functionality. This evaluation is crucial so that users can interact with the Agrovest website easily and effectively, and user experience can be enhanced.

In a previous study conducted by (Sulistiya, 2021), which discussed the application of the Think Aloud method for usability evaluation on the website of the Education and Culture Office of City MNO, it was noted that providing seven task scenarios to eight respondents resulted in failures in completing task scenarios 2 and 3. This was because the respondents still felt unfamiliar with the features provided by the website of the Education and Culture Office of City MNO. Furthermore, (Fitriana, 2023) and (Iftadi, 2023) conducted research on the UNS Academic Information System (SIAKAD UNS) using the same method, namely questionnaires. They explained that the results of the user experience analysis recommendations led to the redesign of SIAKAD UNS. Additionally, (Dewa, 2023) revealed through remote usability testing method in his research that the design results of the RECALL website have an optimal user experience design and meet user needs. However, in this study, Moderated Remote Usability Testing method will be used by combining remote usability method with the presence of a moderator to encourage participants to think aloud.

Based on the background of the research above, the aim of this study is to enhance user experience to make interaction with the Agrovest website easier and more effective. Through the results of moderated remote usability testing analysis, recommendations can also be provided for addressing all forms of user complaints for a better user experience.

2. METHODS

This research employs the Moderated Usability Testing method achieved through non-experimental analysis studies. Objects that have undergone intervention will be analyzed for their negative findings (Ranjit, 2011). Usability testing is defined as "the ability to recall how to perform interactive tasks without difficulty or errors" (Febriyanti, 2024). The modification in this method compared to previous research is that the results of usability testing are not compared with other methods but are used to follow up on improving user experience based on the results of usability testing. To address this situation, remote usability testing is used, where the evaluator and user are separated in space and/or time (Castillo et al., 1998).

The number of findings from usability testing obtained from this intervention is analyzed to make improvements to the Agrovest website. To achieve this goal, which is to compare the number of negative findings from usability testing between remote moderated usability testing alone and with additional interviews (Kelana, et al., 2023).

The steps to achieve the goal are divided into four steps. First, the design stage, which aims to prepare the sequence of Usability testing processes along with the tools that will be used in the implementation stage. Second, the implementation stage, which aims to implement the Usability testing process, namely the Remote Moderated Usability Testing

method. With this method, testing is conducted by five participants using the Zoom Meeting communication tool. The participants are students of the Vocational School of IPB University in the Software Engineering Technology program, 59th generation.

Next, all data in the form of video recordings that have been monitored by the moderator are processed into documents (Ramli, et al., 2009). Subsequently, sentiment analysis is conducted on the documents to identify findings in three sentiment categories, which are positive, neutral, and negative sentiments. The number of findings obtained through the Remote Moderated Usability Testing method is then analyzed to identify which features require further action for improvement based on the usability testing results. The results of the analysis, namely negative findings, will be followed up in this research. Finally, improvement recommendations will be generated based on the results of this study's analysis.

3. RESULT AND DISCUSSION

The first stage is the design stage. In this stage, two steps are undertaken: creating task scenarios and conducting pilot testing. Task scenarios refer to the description of situations or tasks that will be given to participants on the Agrovest website. **Table 1** shows the results of the task scenarios that have been created.

Tabel 1. Task Scenario

Features	Scenario	Task	Success Indicators
Login Register	Users open the Agrovest website (https://id-agrovest.rf.gd/) they can easily access the login and register features. On the login page, users are asked to enter a username and password, while on the register page, they are asked to fill in personal information to create a new account. After successfully logging in or registering, the user will be redirected to the dashboard.	Create an account and log in.	Click the account button> select register an account> fill in the data > click the REGISTER button> return to the web http://id-agrovest.rf.gd/ > the account has been verified. Click the account button> select log in> fill in the username and password> if you forget the password click the LOGIN button> go to the main page / dashboard of Agrovest.
Main Page	This main page contains key information about services, products or content offered by Agrovest. Users can navigate through various sections of the main page to explore available	Explore the content, services and features provided on the website.	Click on the home feature> explore the features provided >interact and the content provided >click logout if you want to leave the website. Click on the home feature> explore the features provided

	content, find the latest information, or access other features provided by the Agrovest website.		>interact and the content provided >click logout if you want to leave the website.
News	When opening the news feature on the website, users will be directed to a page that displays a list of articles or current news related to topics relevant to the content of the website.	Explore the latest news, the latest on fertilizers, crops and agriculture.	Click the news feature >browse news >return to the main page when finished.
Fertilizer Gallery	When the fertilizer gallery feature is clicked, users will be directed to a view that displays the full catalog of available fertilizers. They can easily choose the fertilizer that interests them, see pictures, descriptions, as well as other related information.	Explore different types of fertilizers through the gallery feature, read full descriptions, and view pictures for each product.	Click the gallery feature >select a category, namely the fertilizer gallery >explore the information and images provided >click the provided image category.
Plant Gallery	When the plant gallery feature is clicked, users will be redirected to a view that displays the full catalog of available plants. They can easily choose plants that interest them, view pictures, descriptions, as well as other related information.	Explore different types of plants through the gallery feature, read full descriptions, and view images for each product.	Click the gallery feature >select a category that is a crop gallery >browse the information and images provided >click the image category provided.
Fertilizer calculator	The fertilizer calculator feature involves users in calculating the amount and type of fertilizer needed for a particular field or crop.	Enter the required data such as select location, land area, type of plant, NPK, soil condition then do the calculation results.	Click the > feature select a category > select fertilizer calculator > select a location on the map > select the type of plant > input land area > input NPK > input soil condition >click calculate> The calculation result will appear.

Room Chat	Engage users in direct online interactions with other users or serving parties. Users can enter chat rooms to discuss, exchange information, or get help on specific topics relevant to the website.	Users log in and join conversations easily, discuss certain topics, interact with fellow users.	Click the feature > select a category >select chatroom> type a conversation or message > click send.
Profile	Update and manage their personal information on the platform or website.	Users go to the edit profile page, update personal information such as profile photo and contact details and so on.	Click edit profile >edit the section you want to change or update> click save when you're done.

In the second step, pilot testing is conducted to test the previously created task scenarios. Pilot testing is done to ensure that the task scenarios are well understood by the participants and achieve the desired goals in the study. **Table 2** shows the results of the pilot testing that has been conducted.

Table 2. Pre-Trial Results

Criteria	Result
Moderator instructions	The moderator can provide direction regarding instructions regarding the use of the Agrovest website.
Auxiliaries	Using tools in the form of zoom meetings. Participants' faces must be clearly visible in front of the camera so that the moderator can easily capture their expressions and reactions when using the website.
Task skenario	Participants were directed to use the Agrovest website prototype in this trial session.
	Participants navigated the website to find information about organic fertilizer without the help of a moderator.
	Participants will be evaluated based on their ability to find the necessary information, as well as any confusion or difficulties experienced during the navigation process. The aim of this pilot is to identify potential improvements in the design and functionality of the Agrovest website to improve the overall user experience.

The second stage is the implementation stage. In this stage, the moderator provides instructions according to the task scenarios that have been created to the participants in the Zoom meeting. After the participants perform the tasks, the observer starts observing their expressions, statements, feelings, and thoughts. The implementation is recorded through Zoom recording.

The third stage is Analysis. The results from the Zoom recording by the five participants are observed by reviewing them and then transcribed verbatim for analysis. **Table 3** shows the findings from the moderated remote usability testing process.

Table 3. Moderated Remote Usability Testing Findings

Participant	Feature	Negative findings	Neutral findings	Positive findings
Mahesa Dzikri	All features	The fertilizer calculator display is very confusing because there is no guide.[1]	The appearance of all website designs is good.[1]	The well-designed and intuitive user interface (UI) adapts ESQ, making it easy for users to navigate.[1]
	Login and register		The length of time required to log in or register is not much different from what was expected.[2]	
	Main page		The main page design meets generally accepted aesthetic standards.[3]	Good and intuitive navigation allows users to find what they are looking for quickly and according to ESQ.
	Chat Room	Cannot edit chats, delete and reply to chats from other people.[2]	The overall design of the website is good.	
M.Adzka	Fertilizer Calculator	Overall, it's good, but the fertilizer calculator part should be improved.	The appearance of the main page is good.	
	News		The navigation displayed in this feature is fairly easy.[4]	
Jovanca Blessery	All		Navigation is pretty good.	
	Fertilizer gallery		The layout is easy to understand and simple.[5]	
Anggito Bagas	All features		There are no discernible differences in design or user experience between different features.[6]	.

	Fertilizer calculator	The calculator is still difficult to use because there is no guide at the start. No guidance was given regarding how to use it so I was confused.		
	Chat Room	Cannot edit chats, delete and reply to chats from other people. Limited interaction where you cannot send pictures, videos and videos.[3]	Nice and simple layout.	
Aisya Tyanafisya	All features		The website is responsive.[7]	An attractive appearance adds plus value to this website because it complies with ESQ.[2]
	Fertilizer calculator	Has limitations in terms of plant types or soil conditions that can be calculated.[4] The output results do not differ in color.[5] Instructions on how to use the calculator are not explained.	In terms of appearance, the design is good.	
	Chat Room	Some fonts have inconsistent colors.[6] There are no edit, reply and delete chat features.	The scenario stage was executed without problems.[8]	

Based on the results of the usability testing process conducted on the Agrovest website using the remote moderated usability testing method, a total of 16 findings were identified. Almost all of the findings were related to design issues on the Agrovest website. From these findings, it can be identified that two of them are categorized as positive findings, indicating that there are aspects of the website that function well and meet the Emotional Spiritual Quotient (ESQ) of users. Eight other findings are classified as neutral findings, indicating areas where the website can be improved without urgent needs. Meanwhile, six negative findings highlight issues that need to be addressed or

fixed promptly to enhance the user experience. In practice, many websites still face various obstacles that make them less attractive to users, resulting in them not being able to operate optimally (Pangastuti, 2019).

Based on the findings from moderated usability testing, user experience plays a key role in providing valuable insights. User experience (UX) is one of the concepts of Human-Computer Interaction, and the term UX was introduced by Donald Norman in the 1990s (Al-Kkhairi, 2022). In the implementation stage, improvements made based on these findings can encompass various aspects, starting from enhancing features that received many negative feedback from users, then proceeding to neutral findings. It is hoped that the design solutions resulting from the testing can address issues and meet the needs of Agrovest website users (Aulia, 2020).

Improving user experience based on the findings of moderated usability testing conducted during the implementation stage involves several fixes that need to be addressed promptly, namely in the Fertilizer Calculator and Chat Room features. Because in both features, users encountered many negative findings that hindered them from using the Agrovest website. **Figure 1** shows the display before the improvement, and **Figure 2** shows the display after the improvement in the Agrovest website's Fertilizer Calculator feature.

Figure 1. Fertilizer Calculator Display

Figure 2. Fertilizer Calculator Improvements

As for **Figure 3**, it shows the display before the improvement in the Chat Room feature, and **Figure 4** displays the appearance after the improvement in the Chat Room feature.
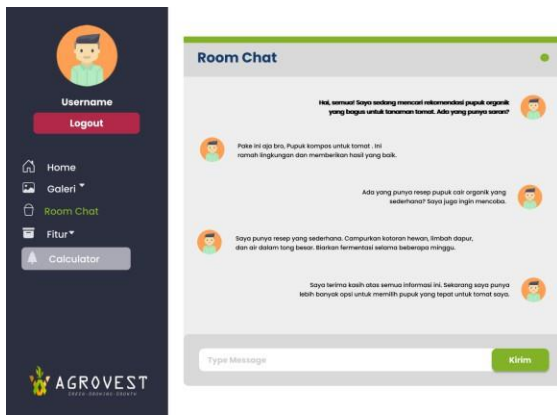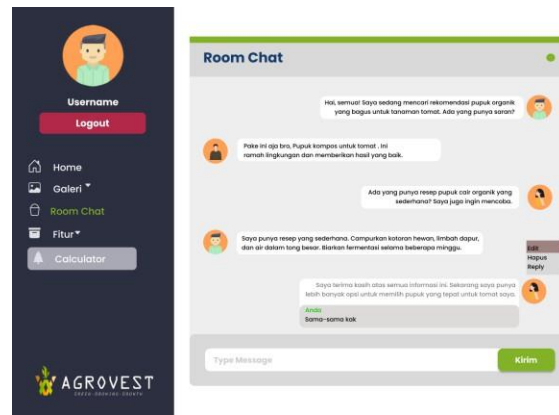
Figure 3. Chat Room display

Figure 4. Chat Room Improvements

4. CONCLUSION

This research is to improve the user experience of the Agrovest website as a source of information about agriculture. The Agrovest website is a form of modernization and digitalization of agriculture. This research applies a moderated usability testing method which is used to improve user experience. The moderated usability testing method that has been carried out on users shows that negative findings were found on several features of the Agrovest website. This shows that there is a need for improvement in several parts which are often found with negative results. In this way, it is hoped that this research can help improve a better user experience on the Agrovest website.

From the contributions that have been made, this research has limitations which create opportunities for further research. One of these limitations can be seen in the number of participants who carried out moderated usability testing, namely five people. It is hoped that in future research the number of participants will be greater so that the user experience results can be much more effective and accurate in improving the user experience of the Agrovest website than in the current research. Apart from that, a comparison of the moderated remote usability testing method can be carried out using two methods to see the effectiveness of this method, namely through think aloud and interviews. So that the results of the user experience level can be seen in more detail. What users complain about on the website can be immediately corrected and a more effective solution can be found.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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