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Design and Development of a Website-Based "Agriplan" Information System to Help Plant Care

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Abstract **Agriculture has been an important part of human life for a long time, with farmers as the main drivers. Farmers often face the challenge of increasing land conversion, especially in West Nusa Tenggara (NTB) with population growth and the need for land for housing, offices, and government facilities. As a result, every year around 10,000 hectares of agricultural land in NTB shrinks from a total of 270,000 hectares, causing an increase in raw material prices, economic decline and loss of farmer jobs. This research aims to develop a Website-Based "Agriplan" Information System to Assist Plant Care, to support the management of narrow agricultural land with access to agricultural information and solutions. Development using Personal Extreme Programming method, with a qualitative approach through observation and interviews, as well as Black Box Testing and User Acceptance Testing. The test results show that 90.04% of this system is effective in supporting sustainable agriculture.**

Key words**: Agriplan, Personal Extreme Programming, Plant, Information System.**

I. INTRODUCTION

Indonesia is known as an agricultural country, with around 40% of the population working as farmers. Most Indonesians work in the agricultural sector. In addition, Indonesia is crossed by a series of mountains that make the land fertile. The fertility of Indonesia's agricultural land is due to its geographical location in a tropical climate, which supports the process of rock weathering optimally, so that the soil becomes fertile [1].

Agriculture has been a part of human life since ancient times, with archaeological evidence showing the existence of agricultural activities in the past. As a life science, agriculture studies the entire range of human activities related to the management, production, and marketing of crops and livestock to meet food and clothing needs[2]. Farmers play a major role in the agricultural sector, playing an important role in realizing food security. Through the efforts of farmers, household food needs to industrial raw materials can be met. However, farmers often face a variety of complex challenges, which directly affect their productivity. These issues, such as climate change, lack of access to modern agricultural technology, pests and plant diseases, and limited resources, cause crop yields to decline significantly. As a result, raw material prices are increasing, which not only reduces farmers' income, but also worsens their overall welfare. This condition not only affects farmers but is also felt by housewives who have to face spikes in food prices, making it difficult to fulfill their daily basic needs.

Land as a production resource that can be passed down from generation to generation is an important element in agriculture. With rapid population growth, the need for land for housing, offices, and government facility buildings is increasing, resulting in shrinking agricultural land. This condition causes many farmers to lose productive land, so they start to switch from farming profession. In the long run, this reduction in agricultural land not only affects the economic stability of farmers, but also has the potential to threaten national food security and worsen socio-economic conditions in a region [3].

The Head of the Agriculture Office explained that agricultural land in NTB Province continues to decrease by 10 thousand hectares from a total of 270,000 hectares each year [4]. The largest land conversion in NTB occurs on Lombok Island which reaches 17,334.19 hectares per year, spread across Mataram city 638.10 hectares, West Lombok 1,624.80 hectares, Central Lombok 3,118.59 hectares, North Lombok 5,061.50 hectares, East Lombok 6,891.20 hectares per year [5]. Although yard land is often narrow and limited, it can still be utilized for agricultural cultivation activities [6]. Therefore, innovations in farming are needed so that people can utilize narrow land, such as house yards, rooftops, and small yards around the house, for gardening with optimal results.

Most of the population experiences problems in applying cultivation techniques that lack precision, i.e. farming with correct and targeted methods. In the field, farming activities are often carried out based on instinct and experience alone. Only a few farmers in Indonesia are educated with adequate knowledge of agricultural practices. To address this problem, an information system called "Agriplan" was created to help with crop care and provide education on various aspects of agriculture. The

system provides complete information ranging from crop definition, how to plant, ideal temperature, fertilization, watering, to solutions to crop problems.

"Agriplan" provides useful features, especially for people who have no farming experience or who only have a hobby of gardening. One of the features available is plant disease diagnosis, which can provide disease diagnosis results on specific plants. In addition, "Agriplan" is equipped with a product sales feature that provides information and options for purchasing seeds, fertilizers, pesticides, and gardening tools. All information provided has been verified and customized with sources from crop experts.

This system development uses the Personal Extreme Programming (PXP) method, because this method has the advantage of a short, iterative and flexible work process. This method also allows developers to adjust and respond to changes in user needs, so as to provide the best recommendations for plant care [7]. With the features of crops, products, diagnosis, and articles, the use of "Agriplan" is expected to help increase productivity and agricultural yields for users.

II. Literature Review

The development of the "Agriplan" system is based on previous research, which serves as the main reference in designing the features of the plant care information system as follows:

In a study entitled "Designing an Application for Plant Care Information Using the Waterfall Method", the application developed was named "Tanduran". This research aims to facilitate users in finding information about various plants, how to care for them, and gardening tips. The software development method used is waterfall, which is a systematic and sequential approach to system development. The results of this study include several main features such as the main page, plant detail page, article detail page, explore page, and user profile page. System testing is done using the Black Box technique [8].

In the research entitled "Designing ObatPedia Information System as an Educational Media about Website-Based Drugs" aims to develop educational media for medicines for the public and pharmacists. The development method used is Personal Extreme Programming (PXP), which includes the stages of planning, iteration initialization, design, implementation, and testing. The research results in the form of a "ObatPedia" website with drug information features, discussion forums, health articles, and online consultation services. Testing uses the Black Box and Mean Opinion Score (MOS) methods [9].

In a study entitled "Design and Development of An Android-Based Nutrition Education And Stunting Prevention Information System For Pregnant Women". This study aims to develop an Android application called Yess Nutrition as a means of education for pregnant women about nutrition and stunting prevention. The development method used is design thinking and personal extreme programming (PXP), with the utilization of the Flutter Framework and NoSQL database. The result of this research is the Yess Nutrition application, which is proven effective in increasing the knowledge of pregnant women about nutrition and stunting prevention. Application testing uses the Black Box and User Acceptance Testing (UAT) method [10].

In a study entitled "Information System for Herbal Plants and Traditional Medicinal Herbs as an Alternative to Web-Based Natural Medicine". This research aims to develop a web-based information system that provides information related to herbal plants and traditional medicinal herbs. The methods used include data collection through field observations, interviews, and literature studies. The result of this research is a system that is easily accessible to users, allowing them to get information about herbal plants and medicinal herbs. System testing was conducted with a focus on accessibility, speed, and ease of use by end users [11].

In a study entitled "Plant Seed Sales Information System at the Android-Based Higar Agro Store". The purpose of this research is to develop a web-based sales information system that can increase efficiency in managing sales and stock items. The development method used is the Waterfall model, with PHP, Android, Java programming languages, and MySQL database. The results of this study are in the form of an information system web application that makes it easier to find information, facilitate the transaction process, manage sales data, and manage stock items [12].

Thus, the "Agriplan" information system will be designed and built to assist the community in overcoming crop problems, equipped with features such as crop information, products, articles, and crop diagnosis.

III. Methodology

A. Research Flow

The research flow that describes the stages carried out during this research process can be seen in Fig. 1.

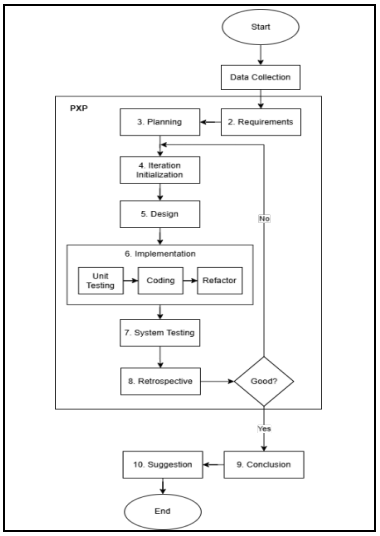

Fig. 1. Research flow

Fig. 1, the overall research flow diagram illustrates, data collection through interviews and literature studies to extract various information from users and software development using the PXP method.

B. Data Collection

In this case, researchers used qualitative data collection methods. Qualitative research methods usually use in-depth analysis based on philosophy, which is used to examine a scientific object (conduct experiments) where the researcher acts as a key instrument, data collection and analysis techniques are inductive or qualitative with results that emphasize meaning. The purpose of qualitative research is to recognize social situations and portray conditions and describe phenomena in order to understand the object of research [13]. Before conducting interviews, researchers first analyzed 11 competitor applications and similar websites to compare and understand the features available in them. After that, one of the apps or websites will be chosen as an experimental material during the interview, with the aim of knowing the features desired by users when making similar applications.

B.1. Interview

An interview is a conversation or question and answer between two or more parties that can be done face-to-face or even through communication tools, and has a specific purpose. The question and answer occurs when one party as an interviewer who will ask questions and the second party as an informant who provides information or answers related questions given by the interviewer [14].

Researchers conducted interviews with farmers and surrounding communities who have an interest in planting as well as those who already manage agricultural land or gardening in their yards. Interviews were conducted with 5 respondents, namely a farmer from Central Lombok, three respondents from East Lombok who are actively gardening in their yards, and one respondent from East Lombok who has an interest in gardening. The purpose of this interview is to understand the needs and expectations of users of the system, so that its development can be tailored to the needs of users.

B.2. Literature Study

Literature study is a method carried out by researchers by understanding and studying theories, reading or reviewing various literature related to current research. The aim is to collect references based on data through research that has been conducted by previous researchers, such as books, scientific papers, articles, theses and other valid sources, which are related to the research that the researcher will carry out [15].

Researchers reviewed various books and references related to plant diseases to ensure the diagnosis feature developed was accurate and relevant. From books and references, researchers collected 131 data covering diseases, symptoms and treatments. This information becomes the basis for determining symptoms, diseases and treatment methods, so that the diagnosis feature can provide appropriate recommendations [16][17][18].

C. Personal Extreme Programming

In this research, software development uses the Personal Extreme Programming method which is often referred to as the PXP method. PXP is an adaptation of the Extreme Programming (XP) method that contains important values such as simplicity, communication, feedback, and respect [19]. XP was created by a software engineering expert namely Kent Beck, Ron Jeffries and Waed Cunningham [20]. PXP is one of the methodologies in the development of agile software development systems, where in this method the software development process is designed for individual programmers [21][7]. This method is very responsive to change, because the development process is iterative which allows programmers to work independently, so they can be more focused and flexible in meeting or improving the quality of the final result [22]. The following is an explanation of the PXP method process:

C.1. Requirements

Requirements is the initial phase that results from collecting data on user needs, conducted through interviews in the previous stage together with the client. This stage then produces user stories that describe the needs and expectations of users of the system [23]. In this research, farmers and the general public act as clients who provide input on the needs of the system being developed.

1. User Requirements Analysis

In this system there are two users who can use the system, namely admin and user. Admin is a person who has duties and authority that can create, read, update and delete on the diagnosis, plant, product, and article menus. Which will be displayed on the user page. Admins can also see how many users have registered. While Users are people who can see plant information, products, read articles, and can diagnose plant diseases, of course by logging in first. The following explanation of each user can be seen in Table I.

TABLE I. USER REQUIREMENTS ANALYSIS

No.	User	Needs
1.	Admin	- Log in - View the dashboard - View diseases list - CRUD the diagnosis - View plants list - CRUD the plant - View product list - CRUD the product - View article list - CRUD the article - View user list - Delete user
2.	User	- Log in - View home page

		- View the plant information page - View the plant information detail page - View the product page - View the product information detail page - View the product seller page - View the article page - View the article details page - View the diagnosis page - View the disease diagnosis page - Clicking plant name, disease symptoms, disease check - View the plant disease details page

2. System Requirements Analysis

This process is based on analyzing user needs to provide an overview. This step is carried out to identify the supporting components in system development, these needs can be seen in Table II.

TABLE II. SYSTEM REQUIREMENTS ANALYSIS

No.	Needs
1.	The system is able to verify user access rights through the login form with email and password input.
2.	The system gives an error message if the user or admin enters the wrong email or password, and forgets to input one of the form fields and does not match the existing database.
3.	The system can CRUD disease data in the admin diagnosis feature.
4.	The system can CRUD plant data in the admin plant feature
5.	The system can CRUD product data in the product feature admin
6.	The system can CRUD article data in the article feature admin
7.	The system can delete user data in the admin user feature
8.	The system can display the landing page
9.	The system can display the home page
10.	The system can display the plant information page
11.	The system can display plants according to the user's key search bar
12.	The system is able to provide a blank or not found message when the key search does not match the plant name
13.	The system can display the plant detail page
14.	The system can display videos on how to grow plants
15.	The system can display the results of accessing youtube video links on how to grow plants
16.	The system can display the product page
17.	The system can display products according to the user's key search bar
18.	The system is able to provide a blank or not found message when the search key does not match the product name
19.	The system can display the product detail page
20.	The system is able to display related products according to the selected product
21.	The system can display the results of accessing certain e-commerce product links
22.	The system can display the article page
23.	The system can display articles according to the user's search bar key
24.	The system is able to provide a blank or not found message when the key search does not match the article name.
25.	The system can display the article detail page
26.	The system can display the diagnosis page
27.	The system can display the plant disease detail page
28.	The system can display the results of disease diagnosis according to the input of plants and disease symptoms from the user
29.	The system can terminate access when admin and user logout

C.2. Planning

Planning is a stage that results from analyzing user needs, by determining the features and functions of the system to be developed, to determining the schedule for implementing system development [24]. So in system planning, user stories are created based on the analysis of user and system needs, with a total of 40 user stories identified. The system development process in the first iteration took 74 days to complete all user stories, as shown in Table III.

TABLE III. USER STORIES

US Code	Description	Estimation (days)
	Iterasions 1	
US-01	As an admin and user, you can enter your email and password to login to the system.	2
US-02	As an admin can see the dashboard	2
US-03	As an admin can see the list of plant diseases	1
US-04	As an admin can add plant diseases	2
US-05	As an admin can see the details of each plant disease	1
US-06	As an admin can edit plant diseases	2
US-07	As admin can delete plant diseases	2
US-08	As an admin, you can view a list of plant disease symptoms	1
US-09	As an admin can add plant disease symptoms	2
US-10	As an admin can edit plant disease symptoms	2
US-11	As an admin can delete plant disease symptoms	2
US-12	As an admin can view the list of plant disease knowledge bases	1
US-13	As admin can add plant disease knowledge base	2
US-14	As admin can delete plant disease knowledge base	2
US-15	As an admin can view the list of plants	1
US-16	As an admin can add plant data	2
US-17	As admin can edit plant data	2
US-18	As admin can delete plant data	2
US-19	As admin can view product list	1
US-20	As admin can add products	2
US-21	As admin can edit product data	2
US-22	As admin can delete product data	2
US-23	As an admin can view the list of articles	1
US-24	As an admin can add article data	2
US-25	As admin can edit article data	2
US-26	As admin can delete articles	2
US-27	As admin can view user list	1
US-28	As an admin can delete user data	2
US-29	As a user can see the home page that contains information about plants, products, articles and diagnosis	1
US-30	As a user, you can view the plant information page and search for plants based on the plant name	2
US-31	As a user, you can view the detailed plant information page	3
US-32	As a user, you can view the product page and search for products by name or category	3

US-33	As a user can see the product detail page, even products related to the product viewed	2
US-34	As a user can see the product seller page related to certain e-commerce	2
US-35	As a user can view the article page and search for articles based on the article name	2
US-36	As a user can view the article detail page	1
US-37	As a user can view the diagnosis page and disease list page	2
US-38	As a user can perform disease diagnosis by selecting the plant name and selecting plant symptoms	4
US-39	As a user can view the plant disease detail page	2
US-40	As admin and user can logout the system	2

C.3. Iteration Initialization

This stage is the functional or behavioral modeling phase of the system, where the system that has been designed will be described in more detail using Unified Modeling Language (UML) diagrams [25]. UML is a tool that is often used in the development of object-oriented systems, because of its ability to document various aspects of the system in an effective and structured manner [24]. One of the diagrams used in this research is the use case diagram (UCD), which aims to provide an overview of how the system works. In the UCD in Figure 2 there are landing page, dashboard and home, which are often considered to have similar page views. However, in this system, researchers make differences in the appearance of each page. The landing page contains login and register buttons, as well as information about the application. The dashboard page is a page for the admin that displays the total content that has been created and the number of verified users. Meanwhile, the home page displays content for users that represents each feature in the system.

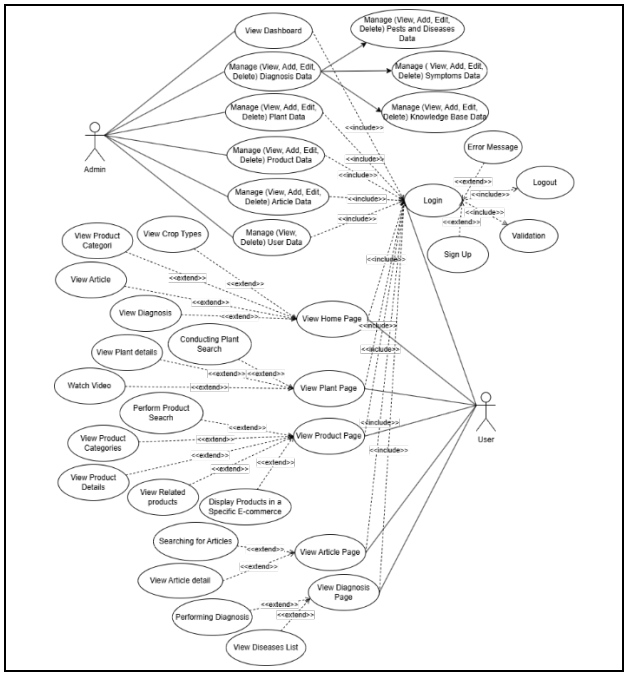

Fig. 2. Use case diagram

C.4. Design

Design is the stage of modeling or designing the appearance of the system and database based on the results of the previous user requirements analysis [23]. At this stage, Entity Relationship Diagram (ERD) is a basic technique commonly used to design databases and is based on an inter-entity relationship model. ERD represents data visually to show the interrelationships between entities in the database. This diagram helps the designer in analyzing and understanding the database structure [26], as well as documenting the database structure as shown in Figure 3, and a mockup will be created to visually illustrate the appearance of the system which can be seen in Figure 4.

1. Entity Relationship Diagram

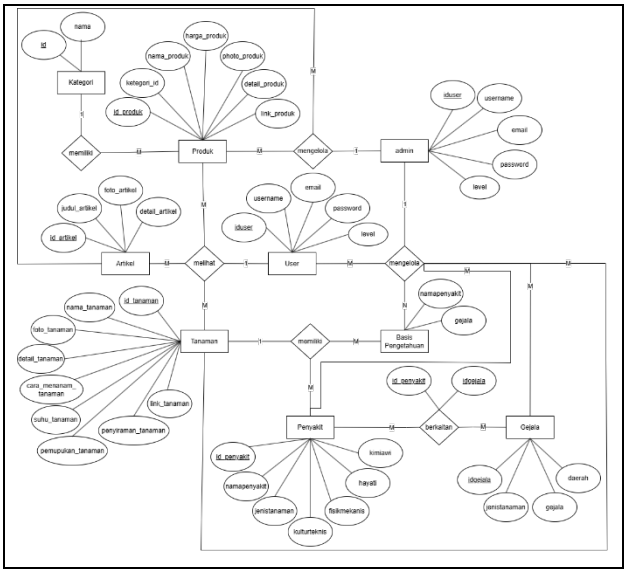

Fig. 3. Entity relationship diagram

2. Interface Design

The design of the interface for the display of the system to be made is adjusted to the process or stages that have been carried out previously. The interface design at this stage is in the form of mockups of the various pages created, including the landing page, login page, admin page, and user page. On the admin page, there are several features, namely the diagnosis feature which is divided into three menus: first, the pest and disease menu; second, the symptom menu; and third, the knowledge base menu. In addition, the admin page also features plants, products and articles. On the other hand, the user page also includes several features, including plant, product, article and diagnosis features which are divided into two menus: first, disease diagnosis and second, disease list menu. Here is one of the mockups of the entire system page.

Fig. 4. Mockup landing page

C.5. Implementation

Implementation is a coding stage with the process of implementing the system design model resulting from the previous stage, then creating program codes that will be used to translate the design model into a programming language recognized by the computer. This program code will produce a prototype of the software, using the PHP programming language, HTML, and the Bootstrap framework. Bootstrap is a powerful and intuitive front-end framework, using HTML, CSS and JavaScript, to speed up and facilitate web application development [24]. Besides that, the compiler uses Visual Studio Code and MySQL database management. After coding is complete, unit testing is performed. If errors are found, the system will be corrected or refactored. If there are no errors, the process continues to the next phase.

C.6. System Testing

System testing is the stage of testing all system features that have been made, with a focus on system users [27]. This test aims to ensure that the features and functionality of the system can be accepted and understood properly. This process is carried out to find out and minimize errors or errors during system trials [23]. Through iteration, the feedback obtained will help refine the system to achieve the desired output results. In this study using two testing methods, namely Black Box Testing and User Acceptance Testing.

C.7. Retrospective

At this stage, data will be collected from the previous iteration to draw conclusions about the system. If there are still errors, improvements will start again from the iteration initialization stage to the retrospective stage. This stage also serves to evaluate whether the method used has been effective in helping the system development process and meeting user needs. If the iteration conclusion about the system is considered complete, then there will be no more iterations [28].

IV. Results and Implementation

At this stage, the research results of the development of the Website-Based "Agriplan" Information System to Assist Plant Care will be described, which is carried out in accordance with the design in the previous section. This chapter will discuss the results and testing process of system development using the Personal Extreme Programming method.

A. Implementation Interface

The following is the result of the landing page implementation, which has a login and register button on the navbar, as well as information about the "Agriplan" website.

Fig. 5. Implementation landing page

B. System Testing

Testing of the "Agriplan" website was carried out after the overall system was completed. This test is divided into two methods, namely Black Box Testing and User Acceptance Testing (UAT).

B.1. Black Box Testing

Black Box Testing is testing that emphasizes the functional specifications of software. In this method, testers specify various input conditions and test the functionality of the program based on those specifications. The process involves testing the program by entering data into each existing form. This test is important to ensure that the program functions according to the company's needs [29].

Testing with the Black Box Testing method involves two respondents. The first respondent is a teacher who acts as an admin, while the second respondent is a housewife who acts as a user. Both conduct tests based on their respective roles. Test details can be seen in Table IV.

TABLE IV. Black Box Testing

Admin			
Test Description	**Test Procedures**	**Expected Results**	**Results**
Pest and disease menu diagnosis feature	Add pest and disease data	Managed pest and disease data is stored in the database and displayed on the pest and disease data list page.	Success
	Edit pest and disease data		Success
	Delete pest and disease data		Success
	View details of pest and disease data		Success
	View a list of pest and disease data		Success
Symptom menu	Add symptom data	Managed symptom data is stored in the database and	Success
	Edit symptom data		Success

	Delete symptom data	displayed on the symptom data list page.	Success
	View a list of symptom data		Success
Knowledge base menu	Add knowledge base data	Managed knowledge base data is stored in the database and displayed on the knowledge base data list page.	Success
	Delete knowledge base data		Success
Plant features	Add plant data	managed crop data is stored in the database and displayed on the crop data list page.	Success
	Edit plant data		Success
	Delete plant data		Success
	View a list of plant data		Success
Product features	Add product data	Managed product data is stored in the database and displayed on the product data list page	Success
	Edit product data		Success
	Delete product data		Success
	View product data list		Success
Article feature	Tambah data Add article data	Managed article data is stored in the database and displayed on the article data list page	Success
	Edit article data		Success
	Delete article data		Success
	View list of article data		Success
User			
Test Description	**Test Procedures**	**Expected Results**	**Results**
Plant features	Perform a plant search	Enter the plant page and the system displays plant data	Success
	View plant details		Success
	Watch plant videos		Success
Product features	Perform a product search	Enter the product page and the system displays product data	Success
	Choose one of the categories		Success
	View product details		Success
	Click find item		Success
Article feature	Search for articles	Enter the article page and the system displays article data	Success
	View article details		Success
Diagnosis feature of disease diagnosis menu	Click on the disease diagnosis menu	Enter the diagnosis page and the system displays disease diagnosis data	Success
	Select a crop type, then select one or more symptoms and click check symptoms		Success Success
	View details of the diagnosis result		Success
Disease list menu	Click on the disease list menu	Enter the diagnosis page and the system displays disease data	Success
	Select one of the plant types		Success
	View disease details		Success

The results of testing with the Black Box method can be concluded that the system and its features have been well received and have met user needs.

B.2. User Acceptance Testing

User Acceptance Testing is a method used to assess how the system that has been developed is accepted by users [30]. This test is carried out with end users who directly use the system to ensure that existing functions function according to the expected needs and goals [31]. One commonly used technique is to provide a questionnaire containing questions to users, to get feedback on their experience using the system [30].

The testing process using the UAT method is carried out by demonstrating how the system works to respondents. After that, respondents were asked to answer questions based on their experience with the previously tested application. Testing was carried out by distributing questionnaires to 25 respondents consisting of farmers, the general public, and peers in the neighborhood around the researcher. The following is a list of questions asked to respondents, consisting of 9 questions, which can be seen in Table V.

TABLE V. QUESTIONNAIRE QUESTIONS

No.	Question
1.	Does the interface of the "Agriplan" information system look attractive?
2.	Is the Agriplan information system easy to understand?
3.	Is the "Agriplan" information system easy to use?
4.	Does the "Agriplan" information system make it easy for you to manage crops?
5.	Do the features available in the "Agriplan" information system suit your needs?
6.	Does the "Agriplan" information system function properly?
7.	Are there no errors when using the "Agriplan" information system?
8.	Does the "Agriplan" information system provide useful information to help you care for your crops?
9.	Does the "Agriplan" information system not contain many unnecessary things?

Respondents will be asked to answer the questionnaire questions listed in Table V, with answer options and weights determined in Table VI.

TABLE VI. WEIGHTED ANSWER SCORE

Answer Options	Weights
A Strongly agree/Good	5
B Agree/Good	4
C Enough	3
D Disagree/Good	2

The number of answers given by respondents and the percentage of each answer can be seen in table VII.

TABLE VII. NUMBER AND PERCENTAGE OF ANSWER

Question	Number of Answers				Percentage Answers			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*
1	17	5	3	0	68%	20%	12%	0%

2	17	6	2	0	68%	24%	8%	0%
3	16	8	1	0	64%	32%	4%	0%
4	16	9	0	0	64%	36%	0%	0%
5	12	11	2	0	48%	44%	8%	0%
6	20	5	0	0	80%	20%	0%	0%
7	19	6	0	0	76%	24%	0%	0%
8	18	7	0	0	72%	28%	0%	0%
9	14	11	0	0	56%	44%	0%	0%

The results of Table VII above are then processed to calculate the weight of each question, by multiplying each answer point by the weight that has been determined in Table VI. The following is the result of the calculation can be seen in Table VIII.

TABLE VIII. QUESTION WEIGHT SCORE

Question	Weight Value				Amount	Average
	Ax5	*Bx4*	*Cx3*	*Dx2*		
1	85	20	9	0	114	4,56
2	85	24	6	0	115	4,6
3	80	32	3	0	115	4,6
4	80	36	0	0	116	4,64
5	60	44	6	0	110	4,4
6	100	20	0	0	120	4,8
7	95	24	0	0	119	4,76
8	90	28	0	0	118	4,72
9	70	44	0	0	114	4,56

After obtaining the average value, the next step is to calculate the percentage of each question to assess the quality of the system. This calculation is done to determine the level of feasibility of the system that has been built. The calculation of the value uses the formula:

$$Percentage = \frac{Average\ score}{Weights\ maximum}\ x\ 100\% \qquad (1)$$

The percentage results of each question can be seen in Table IX.

TABLE IX. QUESTION PERCENTAGE

Question	Calculation	Percentage Result
1	$\frac{4,56}{5}$ x 100%	91,2%
2	$\frac{4,6}{5}$ x 100%	92%
3	$\frac{4,6}{5}$ x 100%	92%
4	$\frac{4,64}{5}$ x 100%	92,8%
5	$\frac{4,4}{5}$ x 100%	88%
6	$\frac{4,8}{5}$ x 100%	96%
7	$\frac{4,76}{5}$ x 100%	95,2%
8	$\frac{4,72}{5}$ x 100%	94,4%
9	$\frac{4,56}{5}$ x 100%	91,2%
Average		92,53%

The results of the UAT show that the average percentage obtained for the system built reached 92,53% which is included in the very good category. This figure reflects that the system as a whole has met most of the expectations and needs of users and is considered feasible to use.

C. Restrospective

Evaluation of the system development iterations showed that some user stories were completed ahead of schedule, although some exceeded the estimated time due to the developers' limited experience in working on similar modules. Overall, the first iteration was completed in 62 days, faster than planned.

V. CONCLUSIONS AND SUGGESTIONS

A. Conclusion

In this study, it can be concluded that the developed system successfully meets the needs of farmers and the general public in treating and diagnosing plant diseases. The system is designed in accordance with the analysis of user needs and system specifications that have been set. The test results show that the system is in the excellent category for use, because it has achieved its objectives, namely providing relevant information regarding plant care and assisting users in overcoming problems that arise related to plant conditions.

B. Suggestion

Researchers suggest that this system be developed using other frameworks or programming languages to improve system security. In addition, UI/UX optimization needs to be done to keep up with technological developments and improve product features to support direct transactions in the system, so that the user experience becomes better. Development of the system on a mobile platform is also highly recommended, so that users can access the system more easily via mobile phones.

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