DEVELOPMENT OF A HARVEST INFORMATION CIRCULATION WEBSITE AT THE RICE AND PALAWIJA SEED CENTER UPTD

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Article Info	ABSTRACT
	Currently, the lack of an information system (website) for harvest data makes it difficult for staff at the UPTD Rice and Palawija Seed Center (B2P2) to manage and report rice harvests from B2P2-owned land. This management and reporting are still carried out manually, so this study aims to facilitate data management and reporting of harvest results, expand access to land area data, target rice contribution data, and harvester information. This research employs the Extreme Programming system development method. Extreme Programming is a Software Engineering model that uses an object-oriented approach. The application development for the rice harvest information system utilizes the CodeIgniter framework to ensure a well-structured system; CodeIgniter is a framework based on PHP and MySQL databases. The study results in a website for planning, reporting, and data management of harvests at the UPTD Rice and Palawija Seed Center, assisting in data retrieval and demonstrating proven reliability.

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1. INTRODUCTION

Cianjur is renowned for its rice production, and Indonesia, as an agrarian country, regards the agricultural sector as one of the most vital components of its economy [1][2]. Agriculture contributed 14.9% to the Gross Domestic Product (GDP) between 2010 and 2013 [3][4]. Given the impact of agriculture on the national economy and community welfare, strategies to enhance the productivity and quality of agricultural products are essential [5][6]. Increased productivity directly contributes to improving the welfare of farming communities [7][8]. Utilizing information and communication technology (ICT) has become a key strategy to achieve this goal [9][10]. Many agrarian countries have already implemented information systems in the agricultural sector [11][12].

Technology and information systems (TIS) applications provide strong support for access to data, information, and knowledge in the agricultural sector [13][14]. Indonesia is a country experiencing rapid adoption of agricultural technology aimed at enhancing production quality and quantity in line with advances in science and technology, impacting both pre-harvest and post-harvest activities [15][16]. Agricultural technology has played a key role in increasing the efficiency and productivity of farming businesses in both developed and developing countries [17]. One of the technological advancements in the agricultural sector is the information system (IS) [18][19]. IS functions as a system that facilitates the collection, processing, and storage of data for companies or institutions, enabling quick and accurate presentation of information [20].

The IS application is crucial for enhancing the effectiveness and efficiency of data management, aligning with Government Regulation of the Republic of Indonesia No. 25 (2012) on the Agricultural Land Information System. This regulation highlights the importance of IS in agriculture for data provision, storage, processing, and security. Based on research by Ade Supriatna (2020) on the Rice Harvest Information System in Subang Regency, it is stated that the rice harvest information system was developed to facilitate officials in managing data on crop growth reports and preparing official reports [21][22][23]. The system is also user-friendly, as the rules are easy for users, including non-specialists, to understand.

However, based on observations at the Agriculture Office UPTD Rice and Palawija Seed Center (B2P2), data management does not yet utilize IS related to rice harvest results, and all data recording is done manually. This

approach is highly inefficient for data management. Rice harvest data management is conducted manually, meaning data needed for tenant farmers on B2P2 land is recorded by hand [24]. Often, if an official forgets, they must go back to search through previously recorded data to update harvest targets from tenants. If the tenant's harvest falls short of the target, they must continue submitting harvest yields until they meet the target for each plot they manage. This method is considered ineffective, as it consumes time and energy, and data retrieval becomes time-consuming due to disorganized records. The above explanation aligns with findings from research by Sri Rahayu et al. (2019) on the "Design of an Agriculture Yield Information System Using a Web-Based Unified Approach," which found that farmers struggle to directly inform the public about their agricultural products and lack an information system that offers direct registration features for farmers [25][26].

2. METHOD

The following are the implementation steps for this research, following the outlined sequence using the Extreme Programming method for system development in creating this website:

2.1 Research Object

This research was conducted at the UPTD B2P2 Bojongpicung Agricultural Office, located at Jl. Terusan Moh. Ali, Neglasari Village, Bojongpicung District, Cianjur Regency, West Java 46113. Cianjur Regency borders West Bandung Regency and Garut Regency to the east, Bogor Regency and Purwakarta Regency to the north, Bandung Regency and the Indian Ocean to the south, and Sukabumi Regency to the west.

2.2 Research Method

This study uses a qualitative method with a descriptive approach, presenting data in a way that is easy to understand for any reader. The data collection methods used in this study include Observation, Interviews, Questionnaires, Documentation, and Literature Review.

2.3 System Design Method

The Extreme Programming (XP) method was chosen as the system development method for system design [27][28]. The following is an explanation of the Extreme Programming model:
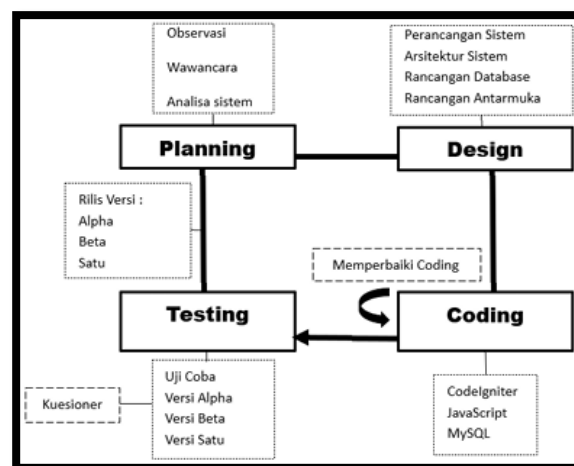

Figure 1. XP Process Flow of Harvest Information System

The following explains the process flow of Extreme Programming for the Paddy Harvest Information Circulation Website at B2P2 Cianjur Regency [29]:

1. Planning: In this stage, system activity requirements are analyzed to help users understand business processes and gain a clear picture of the features, functionalities, and outputs. The development of the paddy harvest website begins by identifying emerging issues and then conducting a user needs analysis for the system to be built.
2. Design: This stage includes system architecture design, database modeling, and interface design to outline the system based on the needs analysis results. The design uses Unified Modeling Language (UML), consisting of various diagrams, including Use Case Diagram, Activity Diagram, Class Diagram, and Sequence Diagram.
3. Coding: This stage involves implementing the system design models into code to create a software prototype. The development of the Harvest Information System uses CodeIgniter, a PHP framework integrated with HTML, CSS, and JavaScript. The database implementation utilizes MySQL.
4. Testing: System testing is conducted in three phases: alpha testing by the developer, using the black-box testing method; beta testing by users (managers) with EUCS-based questions; and the final release testing conducted by the researcher. Beta testing involves feedback from five respondents (UPTD B2P2 staff) using a Likert scale. Release testing consolidates alpha test results and beta questionnaire feedback.

2.5 System Requirements Specification

To realize the website and ensure the smooth development of the application, the researcher categorizes the system requirements into two main groups: software requirements and hardware requirements.

3.   RESULTS AND DISCUSSION

This section outlines the implementation stage of the research method or application development that has been planned, translating the theoretical framework into actual research conducted by the researcher, following the principles and guidelines of scientific inquiry.

3.1   System Analysis & Design

The rice harvest website is an information system (IS) aimed at assisting in the management of rice harvests and data storage at B2P2 Bojongpicung. During the application design phase, a systematic analysis of the system being built is required to ensure smooth and organized progress. This research employs the Extreme Programming method. The implementation of Extreme Programming requires planning to analyze system needs, followed by design as a system analysis and interface design, then coding, which involves formulating or establishing the code, and finally, testing, which involves distributing the application to users and obtaining feedback about the application that has been developed.

3.1.1 Planning

Planning is the initial stage for analyzing the needs of the system, determining the project timeline, and understanding when the application is expected to be completed.

a. User Story
This phase involves analyzing requirements to identify the needs that will guide the application development process. From the research findings, the author gathered the following data on existing issues:
1. There is currently no rice harvest website at the institution.
2. Data processing at UPTD B2P2 is still done manually.
3. Staff experience difficulties when searching for data related to land area and harvest targets of farmers.
Based on these issues, the researcher created an overview of the system to be developed as follows:
1. To create a web-based information system for rice harvests.
2. To establish a rice harvest management system, particularly for the reporting of rice harvest results.
3. To facilitate the search for data regarding land area, rice harvest targets, and farmer information.
4. To serve as an intermediary for managing data related to rice harvests.

b. Functional Requirements
1. General Requirements: The admin must log in first to access the admin page and manage data within the system.
2. Admin: a. Manages master data in the system. b. Adds, modifies, and deletes users. c. Updates admin profile.
    d. Changes the admin password.
3. Manager: a. Manages harvest plan data. b. Manages harvest receipt data. c. Manages reports on harvest plans and receipts. d. Changes password and updates manager profile.

c. Non-Functional Requirements
The analysis of non-functional requirements focuses on the hardware, software, user-friendliness, and implementation ease needed to run the developed application. The specifications for the required hardware and software are as follows:
1. Hardware: This non-functional requirement supports the application's smooth operation. The necessary hardware to run the Rice Harvest System includes a laptop or PC with an 11th Gen Intel(R) Core (TM) i3-1115G4 processor at 2.20 GHz and 4 GB of RAM.
2. Software: The designed application requires supporting software to avoid issues during its operation. The user specifications are as follows: a. The user must understand how to operate a laptop or PC. b. The user must be able to use the Rice Harvest System application.
3. Ease of Use: Users (both admin and managers) should easily understand the features available because the system is designed with a simple interface. Additionally, the system interface is created using Bootstrap templates to ensure responsiveness across different screen sizes.
4. Ease of Implementation: The system is developed with different user access rights for admin and managers. The programming language used is PHP, with MySQL as the database. This allows data to be interconnected, even when using different systems.

d. Planning Analysis
In this planning analysis, the researcher assesses all actions required to complete this research.

3.2   Design

This phase involves designing the system architecture based on the results of the functional requirements analysis, utilizing UML (Unified Modeling Language). UML provides a visual model for designing object-oriented systems. In addition to UML, the system design also includes system architecture, database design, and interface design.

3.2.1 Use Case Diagram

The Use Case Diagram illustrates the interactions between actors and the system from the user's perspective. The following is the Use Case Diagram for the rice harvest system:
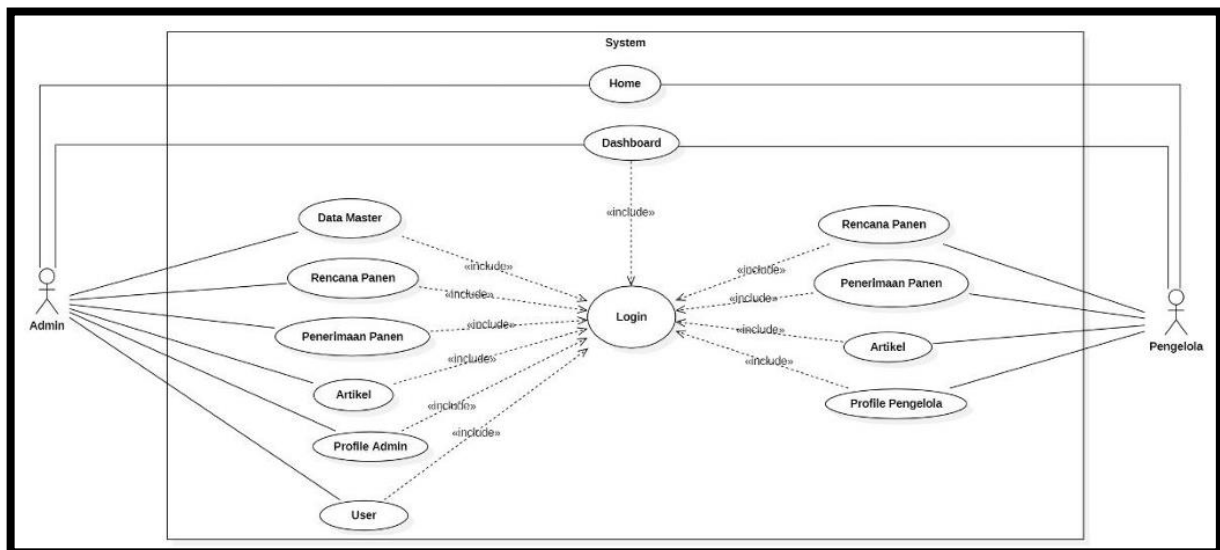
Figure 2. Use Case Diagram of the Rice Harvest Information System

In this system, there are two actors involved in the rice harvest system: the Admin and the Manager, who are both staff members of UPTD B2P2. Both users can access the system and use available features after logging in. Before logging in, both Admin and Manager can access the home page. Once logged in, the Admin can access all menu pages, including the dashboard, master data, harvest planning, harvest reception, articles, admin profile, and user management pages. The Manager can only access specific pages, such as the dashboard, harvest planning, harvest reception, articles, and their own profile page. Below is a description of the use case diagram for the rice harvest information system:

1. Home: This is the initial display of the rice harvest website, accessible by both Admin and Manager without logging in. The page includes a profile and information about UPTD B2P2, as well as articles added by the Manager.
2. Dashboard: This is the main page of the rice harvest website, accessible to Admin and Manager after logging in.
3. Master Data: This page is accessible only by the Admin after logging in. It contains essential data needed by the system, including service unit data, sub-data, worker data, rice variety, grade, season, drying floor, and program data. The Admin can view, add, edit, delete, and print master data records.
4. Harvest Planning: Accessible by the Manager after logging in, this page includes necessary data for rice harvest preparation. This harvest planning data is required during the rice harvest reporting process. The Manager can manage harvest planning data by viewing, adding, editing, deleting, and printing reports.
5. Harvest Reception: Accessible by the Manager after logging in, this page is a form for reporting rice harvests.
6. Articles: Accessible by the Manager after logging in, this page allows the Manager to manage articles by viewing, adding, editing, and deleting them. Articles appear on the home page, allowing users to read about rice farming.
7. Profile: Accessible by both Admin and Manager after logging in, the profile page allows users to edit their profile, change passwords, and view their account details.
8. User Management: Accessible only by the Admin after logging in, this page is used to manage users in the system. The Admin can add, edit, and delete users, manage user access rights, and activate accounts.

3.2.2 Diagram activity

An Activity Diagram is used to model the processes within the system, illustrating each function's activity. Below are the Activity Diagrams for the Rice Harvest System: Home Activity Diagram, Admin Login Activity Diagram, Master Data Activity Diagram, Print Master Data Activity Diagram, Edit Profile Activity Diagram, Change Password Activity Diagram, Profile Details Activity Diagram, Add User Activity Diagram, Activate User Activity Diagram, Edit User Activity Diagram, Delete User Activity Diagram, Manager Login Activity Diagram, Harvest Planning Activity Diagram, Print Harvest Planning Activity Diagram, Submit Harvest Reception Activity Diagram, Print Harvest Reception Activity Diagram, Article Activity Diagram, Edit Profile (Manager) Activity Diagram, Change Password (Manager) Activity Diagram, Profile Details (Manager) Activity Diagram. Each diagram provides a visual representation of the flow of actions within the system's different functions.
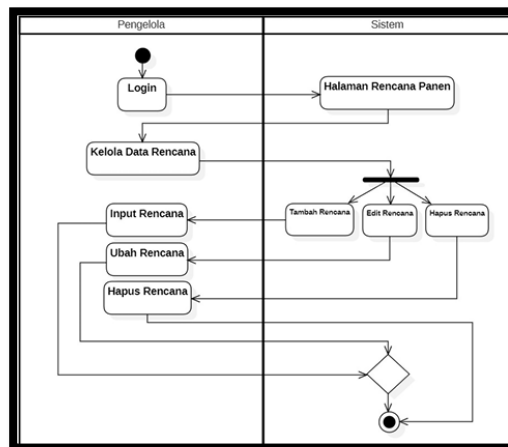
Figure 3. Harvest Planning Activity Diagram

In the Harvest Planning Activity Diagram, the manager can add, modify, and delete harvest planning data. When adding or modifying data, a notification will confirm that the data has been successfully saved. If data is deleted, the system will return to the harvest planning data page.
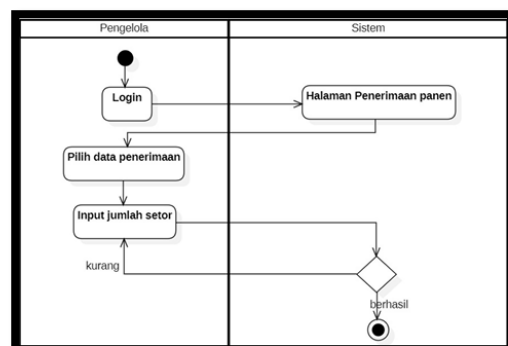

Figure 4. Harvest Receipt Activity Diagram

The harvest receipt activity diagram is managed by the harvest manager. The harvest receipt page functions as a form for submitting harvest results previously handled by the field workers. These field workers must submit their results to the harvest manager according to the target harvest quantity set for each worker. If the harvest submission is below the target, they must make additional submissions.

3.2.3 Class Diagram
The class diagram illustrates the structure of the system in terms of defining the classes that will be created to build the system. Below is the complete class diagram for the Harvest Information System.
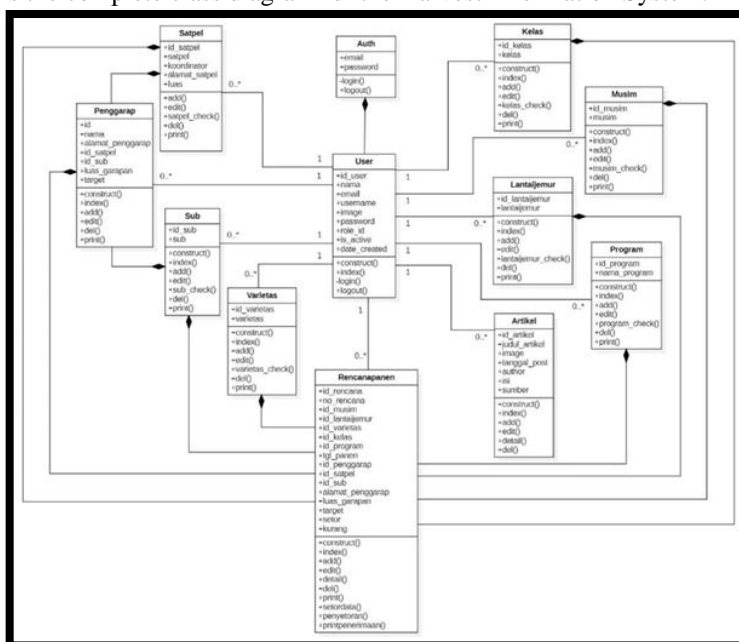

Figure 5. Class Diagram of the Harvest Information System

In the class diagram above, there are 12 classes: auth, user, satpel, penggarap, sub, varietas, kelas, musim, lantai jemur, program, artikel, and rencanapanen. Here is an explanation of the class diagram for the Harvest Information Website:

1. Auth Class: This class is linked to the user class; if the user class does not exist, the auth class cannot function because the attributes in the user class are related to the attributes in the auth class.
2. User Class: In addition to its relationship with auth, the user class is also related to the classes satpel, penggarap, sub, varietas, kelas, musim, lantai jemur, program, and rencana panen. This user class contains two types of users: admin and pengelola. Admins can manage user data by adding, modifying, and deleting entries in this class.
3. Satpel Class: This class is related to the user, penggarap, and rencana panen classes. It can be accessed by the user class (admin), allowing data within satpel to be managed through additions, modifications, and deletions.
4. Penggarap Class: This class is related to the user, satpel, sub, and rencana panen classes. Like satpel, it is accessible by the user class (admin), enabling management of penggarap data, including adding, modifying, and deleting entries.
5. Sub Class: Similar to the penggarap class, it is linked to the user, penggarap, and rencana panen classes. Admins can access and manage sub data as needed.
6. Varietas Class: This class is related to the user and rencana panen classes. Admins can manage varietas data by adding, modifying, or deleting entries.
7. Kelas Class: This class is connected to the user and rencana panen classes, allowing for similar management capabilities by the admin user.
8. Musim Class: Linked to the user and rencana panen classes, this class allows admins to manage seasonal data effectively.
9. Lantai Jemur Class: This class, related to the user and rencana panen classes, can also be accessed by admins for data management purposes.
10. Program Class: Like the lantai jemur class, it is associated with user and rencana panen classes, providing admins with management capabilities.
11. Artikel Class: This class is related to the user class and can be accessed by the pengelola. It allows for the management of article data, including adding, modifying, and deleting entries.
12. Rencana Panen Class: This class is associated with user, satpel, penggarap, sub, varietas, kelas, musim, lantai jemur, and program classes. Accessible by the pengelola user class, it enables management of rencana panen data, including adding, modifying, deleting, and submitting harvest results.

3.2.4 Sequence Diagram

Sequence Diagram is one of the diagrams within UML, illustrating the dynamic collaboration among several objects. Its purpose is to show the sequence of messages exchanged between objects, as well as the interactions between them. Below are the Sequence Diagrams for the Harvest Information System: Sequence Diagram for Article, Sequence Diagram for Admin Login, Sequence Diagram for Adding Master Data, Sequence Diagram for Editing Master Data, Sequence Diagram for Deleting Master Data, Sequence Diagram for Admin Profile Edit, Sequence Diagram for Admin Password Change, Sequence Diagram for Adding User, Sequence Diagram for Editing User, Sequence Diagram for Deleting User, Sequence Diagram for Pengelola Login, Sequence Diagram for Adding Harvest Plan, Sequence Diagram for Editing Harvest Plan, Sequence Diagram for Deleting Harvest Plan, Sequence Diagram for Searching Harvest Receipt, Sequence Diagram for Submitting Harvest Results, Sequence Diagram for Adding Article, Sequence Diagram for Editing Article, Sequence Diagram for Deleting Article, Sequence Diagram for Pengelola Profile Edit and Sequence Diagram for Pengelola Password Change. These diagrams collectively illustrate how various components of the Harvest Information System interact in response to specific actions, showcasing the flow of information and the order of operations within the system
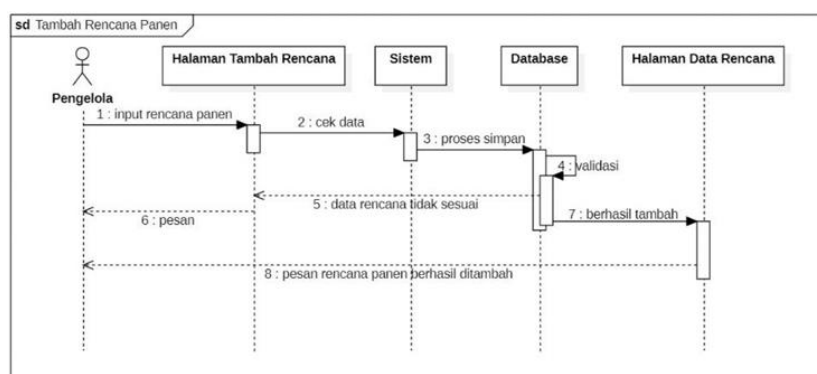

Figure 6. Sequence Diagram for Adding Harvest Plan

This sequence diagram illustrates how the pengelola (manager) can add data for the harvest plan. When the pengelola inputs the data, the system performs validation on the entered information. If the input data is incorrect, an error message will be displayed. Conversely, if the input data is valid, a success message indicating that the data has been successfully saved will be shown.
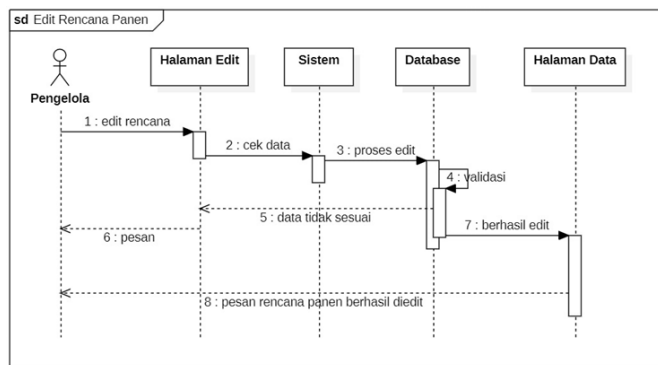
Figure 7. Sequence Diagram for Editing Harvest Plan

In this sequence diagram, the pengelola (manager) can edit the harvest plan data, which will undergo validation. If the modified data is incorrect, an error message will be displayed. Conversely, if the editing is successful, a success message indicating that the data has been successfully updated will be shown.
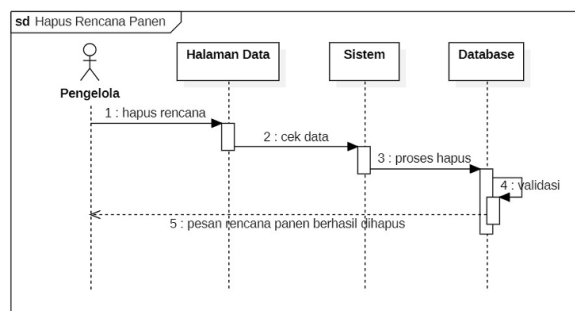

Figure 8. Sequence Diagram for Deleting Harvest Plan

In this sequence diagram, the pengelola (manager) can delete the harvest plan data. If the data is successfully deleted, a success message indicating that the data has been successfully removed will be displayed.
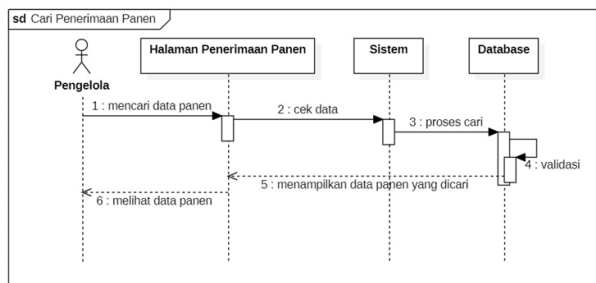

Figure 9. Sequence Diagram for Searching Harvest Receipt

In this sequence diagram, the pengelola (manager) can search for harvest receipt data by using the search menu. The input will first be validated, and then the requested harvest receipt data will be displayed.
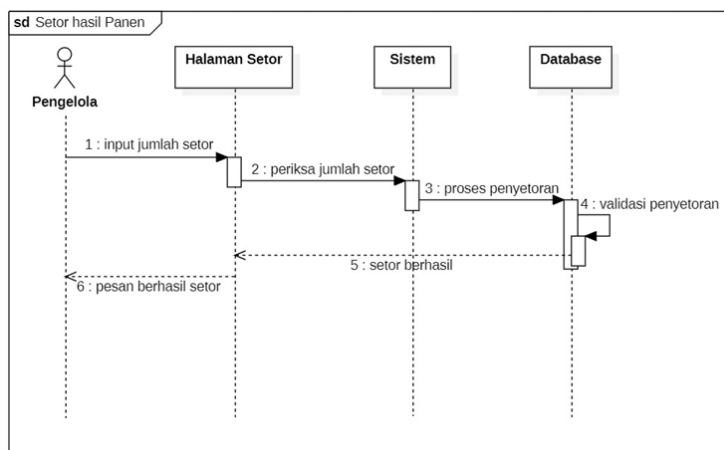

Figure 10. Sequence Diagram for Submitting Harvest Receipt

This sequence diagram illustrates the pengelola (manager) entering the submission of the harvest receipt. If the submission is successful, a success message will be displayed.

3.2.5 System Architecture

The following is the architecture of the rice harvest website that will be designed:
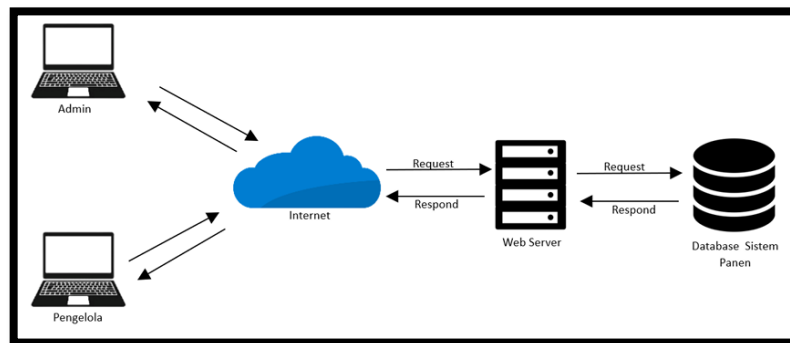

Figure 11. Architecture of the Rice Harvest Information System

The database in the system can be accessed by both the admin and the pengelola (manager). To access the Rice Harvest Website, it must be connected to the internet to retrieve and send data to the database.

3.2.6 Database Design

Database design represents the structure of the data storage media. The database design for the Rice Harvest Information System includes the following tables: User Table, User Role Table, Satpel Table, Sub Table, Penggarap Table, Varietas Table, Kelas Table, Musim Table, Lantai Jemur Table, Program Table, Artikel Table, and Rencana Panen Table.

Table 1. Penggarap Table

Field	Type Data	Length	Keterangan
id	Integer	11	Primary_key dan Auto Increment
nama	Varchar	100	
alamat_penggarap	Varchar	200	
id_satpel	Integer	11	
id_sub	Integer	11	
luas_garapan	Float		
target	Float		

Table 1. Penggarap Table, This table is part of the database used to enter data about the penggarap (farmers) who cultivate the land owned by B2P2 Bojongpicung.

Table 2. Rencana Panen Table

Field	Type Data	Length	Keterangan
id_rencana	Integer	11	Primary_key dan Auto Increment
no_rencana	Varchar	50	Unik
id_musim	Integer	11	
id_lantaijemur	Integer	11	
id_varietas	Integer	11	
id_kelas	Integer	11	
id_program	Integer	11	
tgl_panen	Date		
id_penggarap	Integer	11	
id_satpel	Integer	11	
id_sub	Integer	11	
alamat_penggarap	Varchar	200	
luas_garapan	Float		
target	Float		
setor	Float		
kurang	Float		

3.2.7 Interface Design

In developing the system, an interface design is necessary to facilitate users in interacting with the system. The interface provides the layout of the system's pages, which is used for data input processes and generates output that meets user needs. The interface design for the system to be created includes the following pages: Home Page, Articles Page, Article Detail Page, Admin Login Page, Admin Dashboard Page, Service Unit Data Page, Add Service Unit Page, Edit Service Unit Page, Sub Data Page, Add Sub Page, Edit Sub Page, Farmer Data Page, Add Farmer Page, Edit Farmer Page, Variety Data Page, Add Variety Page, Edit Variety Page, Class Data Page, Add

Class Page, Edit Class Page, Season Data Page, Add Season Page, Edit Season Page, Drying Floor Data Page, Add Drying Floor Page, Edit Drying Floor Page, Program Data Page, Add Program Page, Edit Program Page, Admin Profile Page, Edit Admin Profile Page, Change Admin Password Page, User Data Page, Add User Page, Edit User Page, Manager Login Page, Harvest Plan Data Page, Add Harvest Plan Page, Edit Harvest Plan Page, Harvest Receipt Data Page, Submit Harvest Receipt Page, etc.

Figure 12. Farmer Data Page

The farmers, who manage the land of B2P2 Bojongpicung, serve as actors reporting the results and area of their harvests. This information is crucial for the observations and research conducted by B2P2 Bojongpicung.

Figure 13. Add Farmer Page

The page shown in Figure 13 is designed for adding farmer data. The purpose of this data entry is to provide a comparative basis for the observations made by the researchers at B2P2 Bojongpicung regarding the results of their rice research and observations.

Figure 14. Edit Farmer Page

3.3   Coding
The coding phase involves translating the results of the rice harvest system design into program code, using the Extreme Programming method. This code corresponds to the designs outlined in the Use Case Diagram, Activity

Diagram, Class Diagram, Sequence Diagram, System Architecture, database, and user interface designs. The coding is implemented using PHP as the programming language and MySQL for data storage. During this phase, the author also employs CSS and Bootstrap templates to enhance the system's appearance and ensure it is responsive, allowing users to interact with the system easily, regardless of their device's screen size.

3.4 System Implementation

In this phase, the researcher implements the necessary hardware and software required to run the designed application, including both supporting applications and specific needs. The implementation is as follows:

3.4.1 Hardware Implementation

To run this application properly, several hardware components are necessary to ensure the design can be implemented effectively. The required hardware is as follows: the laptop used for designing and creating the rice harvest system is an HP laptop with the following specifications: a. Operating System: Windows 11 64-bit, b. Processor: 11th Gen Intel(R) Core (TM) i3-1115G4, c. CPU Speed: 2.20 GHz, d. Memory: 8 GB RAM

3.4.2 Software Implementation

Software implementation is a crucial aspect of developing the rice harvest system. The software tools used for implementation include: PHP, MySQL, XAMPP, and others

3.4.3 Interface Implementation

The application of the designs also involves the interface implementation. The interface that has been created is divided into several pages or forms. Below are the interface displays of the system that has been developed, which includes: Home Page, Article Page, Article Detail Page, Admin Login Page, Admin Dashboard Page. Farmer Data Page, Add Farmer Page, Edit Farmer Page, and more.

Figure 15. Farmer (Penggarap) Data Page

Figure 15 shows the implementation of the farmer data page, as previously designed in Figure 12. This page displays information about the target rice yield and the area of land cultivated by each farmer (Penggarap).

Figure 16. Add Farmer Page

Figure 16 displays the implementation of the "Add Farmer" page. This page is designed to enter new farmer data, which serves as a reference for comparing observational data from B2P2 Bojongpicung researchers for ongoing rice research.

Figure 17. Edit Farmer Page

Figure 17 shows the "Edit Farmer" page, which is used to update the details of existing farmers. This page allows administrators to adjust information related to land area and crop yield targets, providing accurate data for research and monitoring by B2P2 Bojongpicung.

3.5   Testing

System testing is the final phase of this research. Testing of the Rice Harvest Information System was conducted in three phases: alpha testing, beta testing, and release version one. Below are the testing r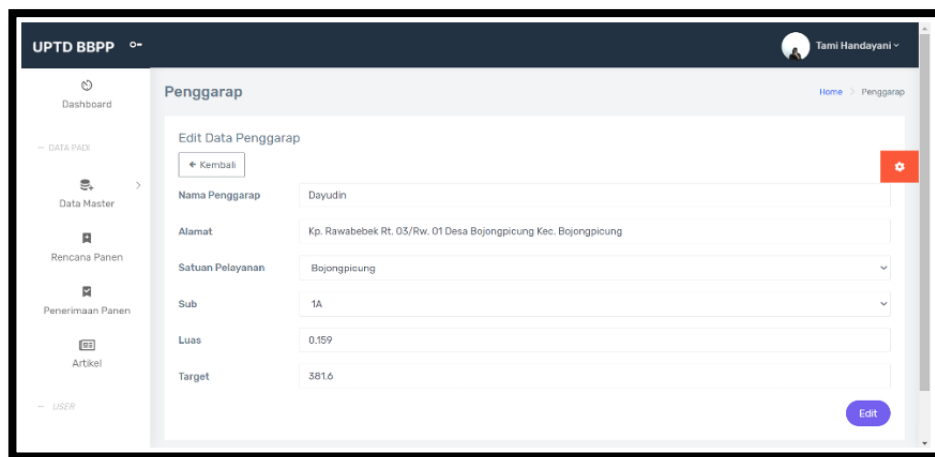esults for the Rice Harvest Information System: Alpha Testing, Beta Testing & Release Version One Testing. The results of these testing phases provide insights into system readiness and areas for improvement prior to full deployment:

a.   Alpha Version Testing: In the alpha version testing, the author conducted tests directly using the black-box testing method. This approach focuses on assessing the functionality of the system's components without analyzing internal code structures. Below is the alpha version testing result for the Rice Harvest Information System's Admin Page:

Table 3. Admin Page Testing Results

Testing Items	Testing Scenarios	Expected Results	Testing Status
Login Menu	Email and password fields are empty, and the login button is clicked	The system denies access and displays 'Email and Password are empty, please fill them in'	Successful
	Email is not filled in	The system denies access and displays 'Email is empty, please fill it in'	Successful
	Password is not filled in	The system denies access and displays 'Password is empty, please fill it in'	Successful
	Entering an unregistered email	The system denies access and displays 'Email is not registered'	Successful
	Entering an incorrect password	The system denies access and displays 'Incorrect password'	Successful
	Entering the correct email and password	Enter the main page	Successful
Satpel Menu	Add satpel data	The system will save the satpel data and display 'Data saved successfully'	Successful
	Edit satpel data	The system will edit the satpel data and display 'Data edited successfully'	Successful
	Delete satpel data	The system will delete the satpel data and display 'Data deleted successfully'	Successful
	Print satpel data	The system will grant access to the satpel data print page	Successful
Sub menu	Add Sub Data	The system will save the sub data and display "data successfully saved"	Successful
	Edit sub data	The system will edit the sub data and display "data successfully edited"	Successful
	Delete sub data	The system will delete the data and display "data successfully deleted"	Successful
	Print sub data	The system will grant access to the sub data print page	Successful
Penggarap	Add farmer data	The system will save the data farmer and display	Successful

(Farmer) Menu		"data successfully saved."	
	Edit farmer data	The system will edit the data farmer and display "data successfully edited"	Successful
	Print farmer data	The system will delete the data farmer and display "data successfully deleted"	Successful
	Print farmer data	The system will grant access to the data farmer print page	Successful
Varietas Menu	Add Variety Data	The system will save the variety data and display "data successfully saved"	Successful
	Edit Variety Data	The system will edit the variety data and display "data successfully edited"	Successful
	Delete Variety Data	The system will delete the variety data and display "data successfully deleted"	Successful
	Print Variety Data	The system will grant access to the variety data print page	Successful
Class Menu	Add Class Data	The system will save the class data and display "data successfully saved"	Successful
	Edit Class Data	The system will edit the class data and display "data successfully edited"	Successful
	Delete Class Data	The system will delete the class data and display "data successfully deleted"	Successful
	Print Class Data	The system will grant access to the class data print page	Successful
Season Menu	Add Season Data	The system will save the season data and display "data successfully saved"	Successful
	Edit Season Data	The system will edit the season data and display "data successfully edited"	Successful
	Delete Season Data	The system will delete the season data and display "data successfully deleted"	Successful
	Print Season Data	The system will grant access to the season data print page	Successful
Drying Floor Menu	Add Drying Floor Data	The system will save the drying floor data and display "data successfully saved"	Successful
	Edit Drying Floor Data	The system will edit the drying floor data and display "data successfully edited"	Successful
	Delete Drying Floor Data	The system will delete the drying floor data and display "data successfully deleted"	Successful
	Print Drying Floor Data	The system will grant access to the drying floor data print page	Successful
Program Menu	Add Program Data	The system will save the program data and display "data successfully saved"	Successful
	Edit Program Data	The system will edit the program data and display "data successfully edited"	Successful
	Delete Program Data	The system will delete the program data and display "data successfully deleted"	Successful
	Print Program Data	The system will grant access to the program data print page	Successful
Admin Profile Menu	Edit Profile	The system will edit the profile data and display "profile successfully edited"	Successful
	Change Password	The system will change the password and display "password successfully changed"	Successful
	Profile Details	The system will display the profile data	Successful
User Menu	Add User Data	The system will save the user data and display "user successfully saved"	Successful
	Edit User Data	The system will edit the user data and display "user successfully edited"	Successful
	Delete User	The system will delete the user account and display "user successfully deleted"	Successful

Table 4. Results of the Manager Page Testing

Testing Items	Testing Scenarios	Expected Results	Testing Status
Login	Click the login button without	The system will deny access and display "Email	Successful

Menu	filling in email and password.	and Password are empty, please fill them in"	
	Email not filled in	The system will deny access and display "Email is empty, please fill it in"	Successful
	Password not filled in.	The system will deny access and display "Password is empty, please fill it in"	Successful
	Entering an unregistered email.	The system will deny access and display "Email is not registered"	Successful
	Entering an incorrect password.	The system will deny access and display "Incorrect password"	Successful
	Entering the correct email and password.	Access to the main page	Successful
Harvest Plan Menu	Add Harvest Plan Data	The system will save the harvest plan data and display "harvest plan successfully saved"	Successful
	Edit Harvest Plan Data.	The system will edit the harvest plan data and display "harvest plan successfully edited"	Successful
	Delete Harvest Plan Data.	The system will delete the harvest plan data and display "harvest plan successfully deleted"	Successful
	Print Harvest Plan Data.	The system will grant access to the harvest plan data print page	Successful
Harvest Receipt Menu	Deposit Harvest Receipt.	The system will save the deposit amount and display "deposit successful"	Successful
	Print Harvest Receipt Data.	The system will grant access to the harvest receipt print page	Successful
Article Menu	Add Article Data.	The system will save the article data and display "article successfully saved"	Successful
	Edit Article Data.	The system will edit the article data and display "article successfully edited"	Successful
	Delete Article.	The system will delete the article and display "article successfully deleted"	Successful
Manager Profile Menu	Edit Profile.	The system will edit the profile data and display "profile successfully edited"	Successful
	Change Password.	The system will change the password and display "password successfully changed"	Successful
	Profile Details.	The system will display the profile data	Successful

b. Beta Testing: Beta testing is conducted objectively through direct user testing in the form of EUCS (End-User Computing Satisfaction) questions. This aims to gather respondents' opinions on the developed system. The questionnaire was administered to 5 respondents from the UPTD Balai Benih Padi dan Palawija (BBPP/B2P2), consisting of 10 questions using a Likert scale from 1 to 4. The questionnaire questions for the beta testing are as follows:

Table 5. Questionnaire Questions

Dimensi EUCS	No	Questions
Content	C1	The rice harvest website provides complete information to meet the needs of rice harvest management
	C2	The rice harvest website makes it easy to deposit rice harvest data
	C3	The rice harvest website facilitates data retrieval
	C4	The rice harvest website simplifies the recording of harvest plans
Accuracy	A1	The rice harvest website has accurate button functions that correspond to their intended functions
	A2	The design of the information displayed in the rice harvest information system is very clear
Format	F1	The rice harvest website has an attractive appearance
	F2	It does not take long to learn how to use the Rice Harvest website
Ease of Use	E1	The rice harvest information system is easy for laypeople to use
Timeliness	T1	The rice harvest information system is very accessible because it is web-based

The following is the assessment provided using a Likert scale for each question:

Table 6. Questionnaire Response Scores

Answer Scale	Description	Score
STS	Sangat Tidak Setuju	1
TS	Tidak Setuju	2

S	Setuju	3
SS	Sangat Setuju	4

Based on the questionnaire data, the percentage of each response can be calculated using the formula:

$$Y = \frac{X}{Skor\ ideal}\ x\ 100\ \%$$

• Where to find the value of x = N x R
• Ideal score: highest Likert value × number of respondents = $4 \times 5 = 20$.

Description:
Y = The percentage value being calculated
X = The sum of the score for each response category multiplied by the number of respondents
N = The score for each response
R = The number of respondents
The results of the beta testing using the Likert scale method are as follows:
Thus, the results of the calculations, or the conclusions of the test based on the above criteria, are as follows:

Table 7. Overall Question Results

Question	Description	Value of Y
C1	Sangat Setuju	80%
C2	Sangat Setuju	80%
C3	Sangat Setuju	85%
C4	Sangat Setuju	95%
A1	Sangat Setuju	80%
A2	Setuju	70%
F1	Sangat Setuju	85%
F2	Sangat Setuju	85%
E1	Sangat Setuju	85%
T1	Sangat Setuju	75%
Total		820%

From Table 5, the final results of the system testing can be averaged as follows: 820/10=82%. The overall average score from the questionnaire results is 82%. Based on the evaluation scale, the rice harvest information system received a rating of "Strongly Agree/ Sangat Setuju "

c. Release Version Testing
Release version testing involves improvements or additions to features based on alpha and beta testing. This testing will serve as feedback or input for further development.

4.   DISCUSSION
Based on the analysis and planning or design of this website, it is intended solely for reporting land area and the rice yield obtained by farmers during a single planting season. As a result, the reports prepared by the farmers still need to go through an operator, which will prolong the process.

5.   CONCLUSION
Based on the research conducted and the results of the analysis, design, and implementation of the system, the author draws several conclusions as follows: 1. The Rice Harvest Results Information System significantly aids in recording planned harvests and submitting harvest results. 2. The Rice Harvest Results Information System greatly facilitates data management at the UPTD Seed Center for Rice and Other Crops. 3. The Rice Harvest Results Information System effectively assists in data retrieval.

REFERENCES

[1]   G. Octania (2021). *The Government's Role in the Indonesian Rice Supply Chain*. https://repository.cips-indonesia.org/media/publications/338075-the-governments-role-in-the-indonesian-r-348e9fc1.pdf.
[2]   Tirtalistyani, R.; Murtiningrum, M.; Kanwar, R.S. (2022). *Indonesia Rice Irrigation System: Time for Innovation*. Sustainability 2022, 14, 12477. https://doi.org/ 10.3390/su141912477.
[3]   Singariya, & Sinha, Narain. (2015). *Relationships among Per Capita GDP, Agriculture and Manufacturing Sectors in India*. International Journal of Finance & Economics. 3. 36-43. 10.12691/jfe-3-2-2.
[4]   Adamon N. Mukasa. (2017). *Africa's Agricultural Transformation: Identifying Priority Areas and Overcoming Challenges*. AfDB. VOLUME 8 l ISSUE 3. pp 1-16.
[5]   Pawlak, Karolina, and Małgorzata Kołodziejczak. 2020. "*The Role of Agriculture in Ensuring Food Security in Developing Countries: Considerations in the Context of the Problem of Sustainable Food*

Production" Sustainability 12, no. 13: 5488. https://doi.org/10.3390/su12135488.

[6] Rambod Abiri, et.al (2023). *Application of digital technologies for ensuring agricultural productivity*. Heliyon. Volume 9, Issue 12. e22601, ISSN 2405-8440, https://doi.org/10.1016/j.heliyon.2023.e22601.

[7] Mulubrhan Amare, et.al (2022). *The Impact of Agricultural Productivity on Welfare Growth of Farm Households in Nigeria: A Panel Data Analysis*. Research Fellow, Partnership for Economic Policy (PEP), PO.Box:30772-01100, Nairobi, Kenya.

[8] Pretty Luci Lumbanraja, et.al (2023). *The Influence of Farmers' Welfare on Oil Palm Plantation Productivity in Indonesia*. Indonesian Journal of Agricultural Research Vol. 06, No. 02, pp. 92 – 105.

[9] Budiarto, Mochamad & Rahman, Abdul & Asrowi, & Gunarhadi, Gunarhadi & Efendi, Agus. (2024). Proposing information and communication Technology (ICT)-Based Learning transformation to create competitive human resources: A theoretical review. Multidisciplinary Reviews. 7. 2024076. 10.31893/multirev.2024076.

[10] Oluwagbemiga Paul Agboola, et.al (2023). *The influence of information and communication technology (ICT) on stakeholders' involvement and smart urban sustainability*. Environmental Advances. Volume 13, 100431, ISSN 2666-7657, https://doi.org/10.1016/j.envadv.2023.100431.

[11] Soepeno, Ryufath & Augustine, Aurelie & Lee, Destine. (2022). *Agricultural Information Systems (AIS) to Overcome World Hunger for Indonesia + IoT Applications*. 10.13140/RG.2.2.29227.72483.

[12] A L Zolkin, et.al (2021). *Features of the use of information technologies in agriculture*. IOP Conf. Series: Earth and Environmental Science 677. 032091. doi:10.1088/1755-1315/677/3/032091

[13] Vidanapthirana, Nisansala. (2019). *Agricultural information systems and their applications for development of agriculture and rural community, a review study*. October 2019.

[14] Ireri, Daisy. (2021). *Role Of Ict In The Dissemination And Access Of Agricultural Information By Smallholder Farmers In South Eastern Kenya*. Acta Informatica Malaysia. 5. 31-41. 10.26480/aim.01.2021.31.41.

[15] Adam, Lukman & Jin, Jia & Khan, Anwar & Hussain, Jamal & Tchaga, Tchapo. (2021). *A Study of the Adoption of Technology in Agriculture: Evidence from the Indonesian Paddy- Rice Farmer*. 10.9734/bpi/cras/v12/2487F.

[16] Sutardi, et al. 2023. *"The Transformation of Rice Crop Technology in Indonesia: Innovation and Sustainable Food Security"* Agronomy 13, no. 1: 1. https://doi.org/10.3390/agronomy13010001.

[17] Sacha Ruzzante, Ricardo Labarta, Amy Bilton. (2021). *Adoption of agricultural technology in the developing world: A meta-analysis of the empirical literature*. World Development, Volume 146, 105599. ISSN 0305-750X, https://doi.org/10.1016/j.worlddev.2021.105599.

[18] Novitasari. (2024). *The Role of Technology in Increasing Agricultural Productivity*. Agricultural Science. Vol 1 N. 1. Journal Link:https://ejournal.mandalanursa.org/index.php/ASc/issue/archive.

[19] Vajjhala, Narasimha. (2021). *Introduction to Agricultural Information Systems*. 10.4018/978-1-7998-4849-3.ch001.

[20] Taherdoost, Hamed. (2022). *The Role of Different Types of Management Information System Applications in Business Development: Concepts, and Limitations*. Cloud Computing and Data Science. 31-48. 10.37256/ccds.4120231959.

[21] I Dewa Putu Oka SUARDI. (2022). *Management Policies Implication for the Agricultural Land Conversion Sustainable Control Strategy in Bali Province*. Journal of Environmental Management and Tourism, [S.l.], v. 13, n. 3, p. 721 - 731. ISSN 2068-7729. https://doi.org/10.14505/jemt.v13.3(59).12.

[22] FX Andy Sutrisno. (2018). *Sustainable Urban Agricultural Land Protection Policy; The Case of Surakarta City, Central Java Province, Indonesia*. Jurnal Perencanaan Pembangunan 227 The Indonesian Journal of Development Planning Vol II No. 3. pp 227-240.

[23] Yanfika. (2024). *Building appropriate strategy for improving the capabilities of agricultural extension services in Indonesia.* Bulgarian Journal of Agricultural Science, 30 (No 1) 2024, 17–27.

[24] Azza, D., Wicaksono, K., & Chandra, D. (2023). *Website-Based Rice Harvest Data Collection Information System*. International Journal of Research and Applied Technology (INJURATECH), 3(1), 97-106. https://doi.org/10.34010/injuratech.v3i1.9962

[25] Moh. Alfian nugroho et.al (2023). *Analyzing potential rice harvest area in mojokerto regency in 2021 using area sample framework (asf)*. Enthusiastic international journal of applied statistics and data science volume 3, issue 2, october 2023, pp. 151-162.

[26] B M Sagar, Cauvery N K. (2018). *Agriculture Data Analytics in Crop Yield Estimation: A Critical Review*. Indonesian Journal of Electrical Engineering and Computer Science Vol. 12, No. 3, December 2018, pp. 1087-1093 ISSN: 2502-4752, DOI: 10.11591/ijeecs.v12.i3.pp1087-1093.

[27] SS Wibangso et.al. (2022). *Extreme Programming Approach in E-PANJO Design to Support Information Management at Nursing Home*. Jurnal Buana Informatika, Volume 13, Nomor 2, Oktober 2022: 93-104.

[28] A. Suryadi et.al. (2024). *The design of the guest application system must report in RT 03 RW 04 appears website-based with the extreme programing method*. Jurnal Info Sains : Informatika dan Sains Volume 14 , Number 01, 2024, DOI 10.54209/infosains.v14i01 ESSN 2797-7889 (Online) https://ejournal.seaninstitute.or.id/index.php/InfoSains.

[29] Dicky Hariyanto et.al (2024). *Implementasi SIMDUMAS Metode Agile Software Development Extreme Programming Pada Kecamatan Bogor Barat Kota Bogor*. IMTechno: Journal of Industrial Management and Technology Volume 5 No. 2 Juli 2024 E-ISSN: 2774-342X.