DESKTOP-BASED PLANTATION MONITORING INFORMATION SYSTEM DESIGN

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Abstract

Lombok Island has extensive land resources with a lot of water content so that it is suitable to be managed and utilized for plantation. The Local Government continues to try to expand the planting area of the plantation sector in order to increase production. Local Government on Lombok Island does not yet have a plantation monitoring information system. So far, plantation data is only recorded in the Microsoft Excel application and the data is stored separately from one file to another. To facilitate monitoring of plantation data, it is necessary to design an information system. Besides that, Local Government needs a plantation monitoring system to control management and development in plantation sector. Some aspects of plantation that can be monitored include the location and area of planting, types of plantation commodities, number of trees, amount of production, planting time, estimated harvest time, income and outlay. With the monitoring system, complete plantation data will be obtained so that Local Government can establish appropriate policies to increase production yields in plantation sector. The plantation monitoring information system designed is desktop-based and using waterfall model as a method. The results obtained from the design are MySQL database design and User Interface design. As for the User Interface testing is done using the Usability testing method. From the test results, it can be concluded that the system design that has been made has obtained approval from Local Government.

Keywords: *Desktop-Based, Plantation, Monitoring, Information System, Design*

**Penulis Korespondensi*

1. INTRODUCTION

Lombok Island is one of two large islands in West Nusa Tenggara Province. Lombok Island has several areas, namely Mataram, West Lombok, Central Lombok, East Lombok and North Lombok. Lombok Island has extensive land resources with very large water content so that it is suitable to be managed and used for plantation. Plantation lands are spread over several areas on the Lombok Island. The plantation land is owned by a company or individual.

The leading plantation commodities on Lombok Island include cocoa, cashew, coffee and sugar palm. Leading plantation commodities are the most profitable mainstay commodities to be managed and have market prospects as well as increase the income of farmers and families, as well as having a large enough potential for land resources. In addition, there are other plantation commodities that are quite a lot and can still be developed, namely coconut, cloves, vanilla, cotton, kapok, tobacco, tamarind and areca nut. This plantation commodity is a significant contribution to the economy on Lombok Island. [1]

Types of plantation commodities produced on Lombok Island are divided into 2 (two) namely annual crops and seasonal crops. Local Government continues to try to expand the planting area of plantation sector in order to increase production. As the area of plantation crops increases, it also impacts on the production of existing plantation crops, both annual and seasonal crops.

Local Government on Lombok Island does not yet have a plantation monitoring information system. So far, plantation data is only recorded in the Microsoft Excel application and the data is stored separately from one file to another. To facilitate monitoring of plantation data, it is necessary to design an information system. Besides that, Local Government needs a plantation monitoring system to control management and development in plantation sector. Some aspects of plantation that can be monitored include the location and area of planting, types of plantation commodities, number of trees, amount of

production, planting time, estimated harvest time, income and outlay. With the monitoring system, complete plantation data will be obtained so that Local Government can establish appropriate policies to increase production yields in plantation sector.

Plantation sector monitoring information system on Lombok Island needs to be designed with features and functions that suit the needs of the local government. The design is done because it is an important stage to build an information system. In this case, the information system designed is a desktop-based plantation monitoring information system. This information system is designed to assist Local Government in monitoring plantation sector on Lombok Island.

The approach used in designing a plantation monitoring information system is the waterfall model as a software development method. Design using Use Case diagrams and database creation with MySQL and User Interface design using Netbeans IDE. As for the User Interface testing is done using the Usability testing method.

2. LITERATURE REVIEW

Desktop-based plantation monitoring information system design is different from several previous studies. In [2], a monitoring system was carried out on plantation yields and production for oil palm plantation, and the system built was web-based. In [3], a monitoring system for temperature and humidity of plantation soil based on the Internet of Things was designed by utilizing the Telegram application. Research on monitoring systems based on the Internet of Things was also carried out in [4], namely for monitoring and controlling coffee plants in the application of smart greenhouses which use a wireless sensor network. Then in [5] a monitoring system based on the Internet of Things is also applied in monitoring agricultural ecosystems such as chili cultivation using android application. Meanwhile in [6], research was conducted on the design of a monitoring and controlling system for public street lighting based on the Internet of Things and based on android.

In other fields such as in [7], a monitoring system is applied to Smart Farming by utilizing the Telegram application to access soil temperature and humidity data. Then in [8], a web-based customer transaction monitoring system was implemented in MNC Play Media using the SWOT analysis method (Strength, Weakness, Opportunities, Threats) and the UML (Unified Modeling Language) modeling system. Then in [9], research was conducted on a web-based monitoring system for the recording and distribution of printed goods using the waterfall method.

3. RESEARCH METHODOLOGY

The research method is a step taken to collect information and analyze the information that has been obtained. Waterfall model used as a method in this research consists of:

a. Data Collection
   Data and materials were obtained by conducting observations and interviews with related parties, namely Local Government in the plantation sector on Lombok Island. In addition, the material was collected from book sources and searches from the internet.
b. System Analysis
   Plantation monitoring information system is adjusted to the needs of Local Government. Some aspects of plantation that can be monitored include the location and area of planting, types of plantation commodities, number of trees, amount of production, planting time, estimated harvest time, income and outlay.
c. System Design
   In designing a plantation monitoring information system, a model of the information system is made, namely by compiling a Use Case Diagram and designing a MySQL database using the XAMPP application.
d. Interface Design
   Interface design of plantation monitoring information system is done by designing the User Interface with JFrame Form and Jasper Report on the NetBeans IDE application which is a desktop-based Java programming language editor.
e. Testing
   User Interface testing is done using the Usability testing method. This method is used to evaluate the usefulness of the product to a group of users.

4. RESULT AND DISCUSSION

The results of desktop-based plantation monitoring information system design are in the form of Use Case Diagram, database design, and User Interface design. In the Use Case Diagram as shown in Lombok Island 1, the user can manage several menus

in the system. These menus include Customer, Land, Plantation, Monitoring, Income and Outlay.

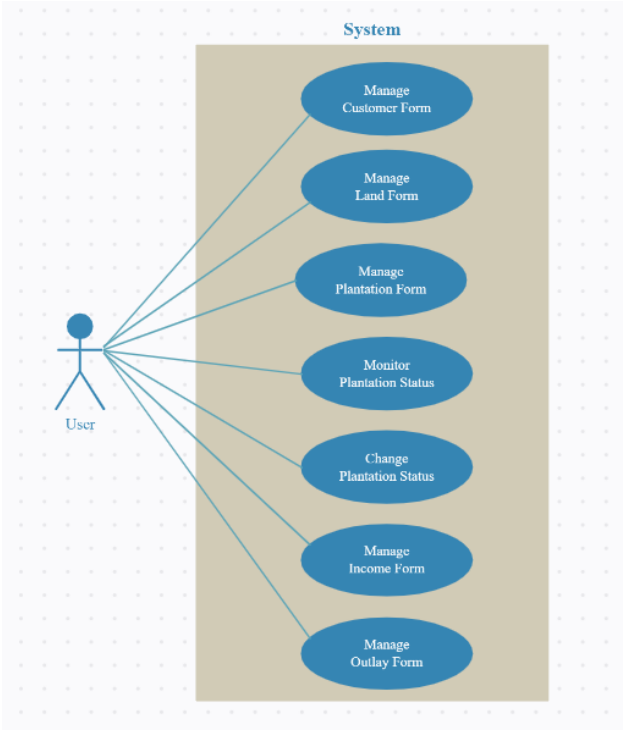

Figure 1. Use Case Diagram

Database design using MySQL database on Xampp application. The name of the database is plantation.sql which has several tables, namely customer, land, plantation, plantation_detail, income and outlay. Each table has columns which are data attributes of the table. Each table in the database also has relationships between tables, which are connected by connector lines, as in Figure 2 which is the database design of plantation monitoring information system.

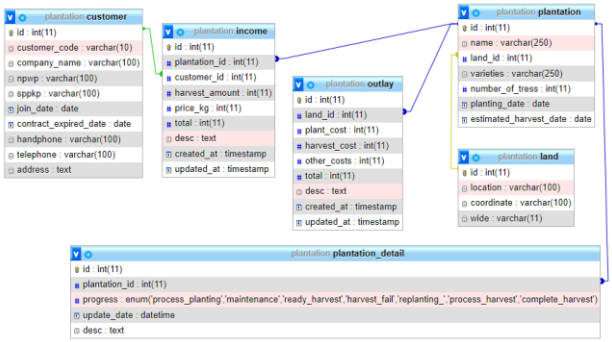

Figure 2. Database Design

User Interface design is done by using JFrame Form and Jasper Report in the NetBeans IDE application. This is done because this information system is desktop based. The design results obtained are in the form of a menu display as shown in Figure 3 to Figure 12.

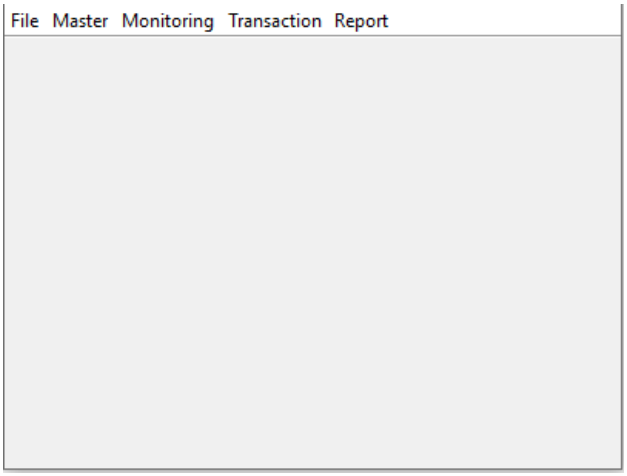

Figure 3. Main Form

Main Form is the menu that will be displayed first, which consists of several menus, namely File, Master, Monitoring, Transaction and Report, as shown in Figure 3. The File menu consists of the Exit menu. The Master menu consists of the Customer Form, Land Form, and Plantation Form. The Monitoring menu displays the Monitoring Form which consists of Status Monitoring and Status Change. Transaction menu consists of Income Form and Outlay Form. While the Report menu consists of Income Report and Outlay Report.

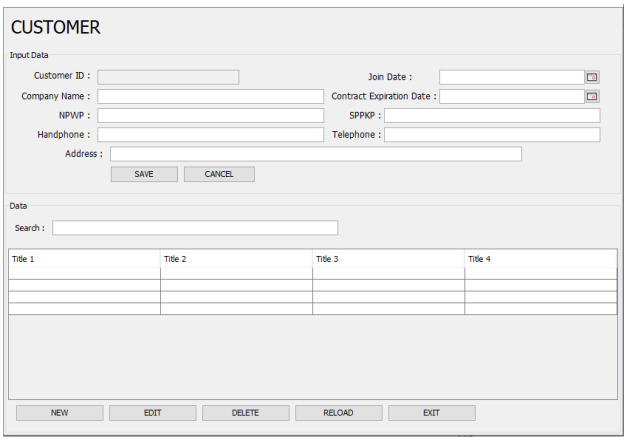

Figure 4. Customer Form

Customer Form is used to manage customer data, as shown in Figure 4. Customer data consists of Customer ID, Company Name, TIN, SPPKP, Mobile, Telephone, Address, Join Date and Contract Expiration Date. Customers are companies or individuals who own plantation land that has been recorded in Local Government.

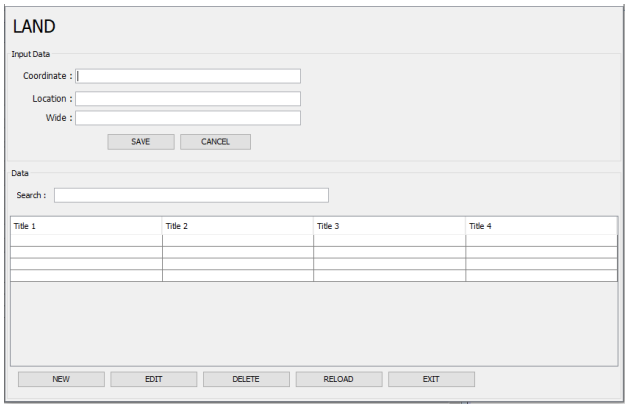

Figure 5. Land Form

Land Form is used to manage land data, as shown in Figure 5. Land data consists of Coordinate, Location and Wide. Land is the location of the plantation area in Lombok Island.

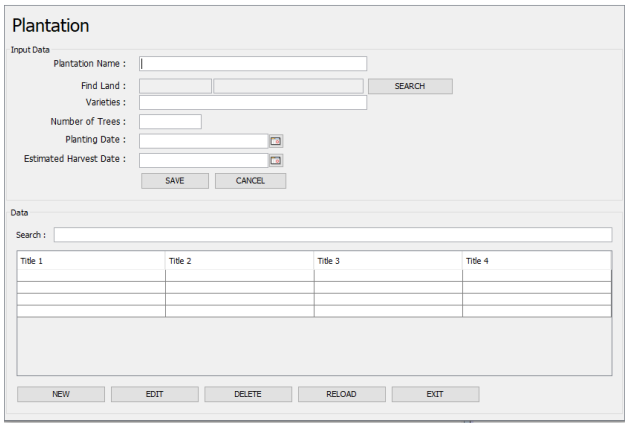

Figure 6. Plantation Form

Plantation Form is used to manage plantation data, as shown in Figure 6. Plantation data consists of Plantation Name, Land, Varieties, Number of Trees, Planting Date and Estimated Harvest Date. Plantation is a plantation area that has different characteristics from one another.

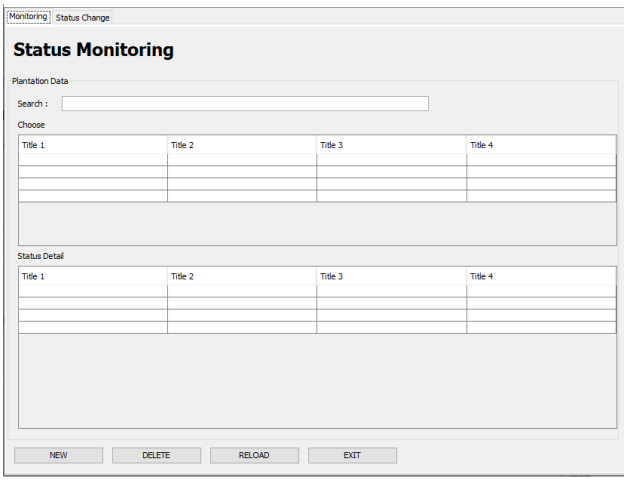

Figure 7. Monitoring Form

Monitoring Form is used to monitor plantation, as shown in Figure 7. The Monitoring Form consists of a Plantation Data table and a Status Detail table. If there is a change in the status of the plantation, it will be changed in the Status Change menu.

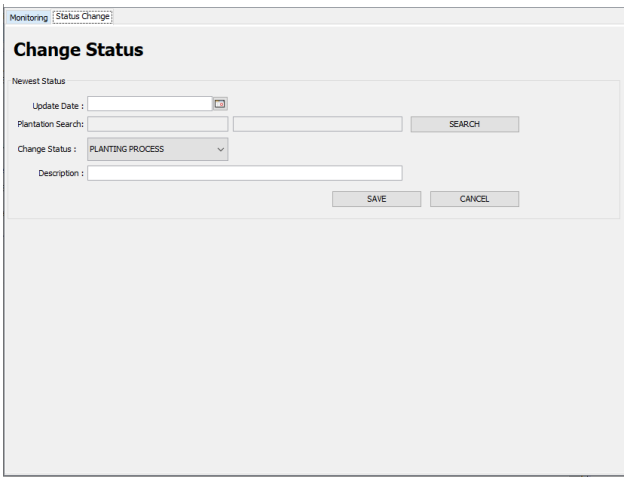

Figure 8. Monitoring Form (Status Change)

In Monitoring Form, there is a Status Change menu which is used to change the status of the plantation, as shown in Figure 8. In this menu, user can select status changes according to the latest conditions from the plantation. The status consists of Process Planting, Maintenance, Ready Harvest, Harvest Fail, Replanting, Process Harvest and Complete Harvest.

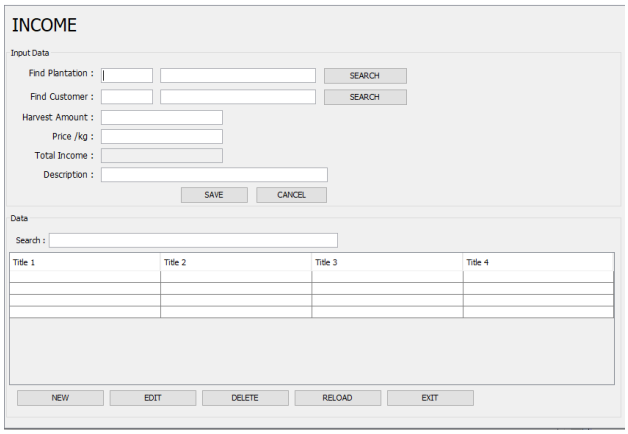

Figure 9. Income Form

Income Form is used to manage income data, as shown in Figure 9. Income data consists of Plantation, Customer, Harvest Amount, Price/kg, Total Income and Description. Income is the income of each customer obtained from the plantation.

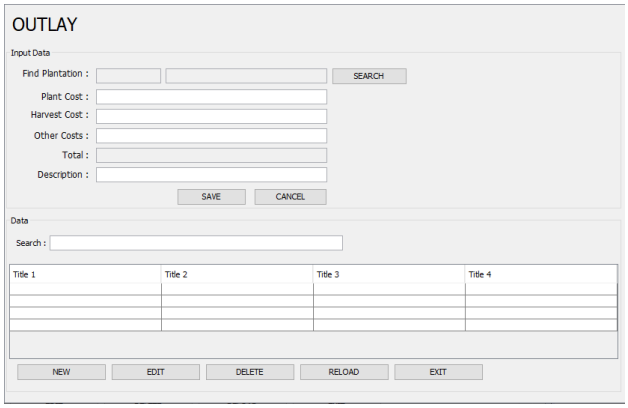

Figure 10. Outlay Form

Outlay Form is used to manage outlay data, as shown in Figure 10. Outlay data consists of Plantation, Plant Cost, Harvest Cost, Other Costs, Total Outlay and Description. Outlay is the amount of expenditure made from planting to harvesting a plantation.

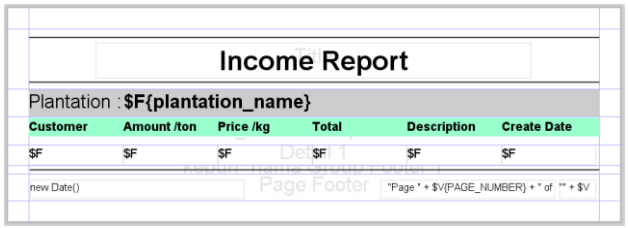

Figure 11. Income Report

Income Report is used to display the Income Report of each plantation, as in Figure 11. Meanwhile, Outlay Report is used to display the Outlay Report of each plantation, as in Figure 12.

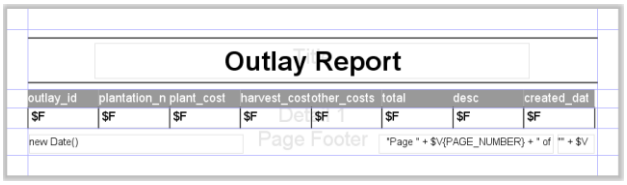

Figure 12. Outlay Report

The User Interface test was carried out on several participants, namely employees in Local Government in the plantation sector on Lombok Island. The test indication is the participant's approval of each menu in the User Interface design of the plantation monitoring information system. The approval is based on the linkage and completeness between the system design and plantation data owned by Local Government as well as the usefulness of the system design that has been made. The User Interface test results are shown in Table I.

Table I. User Interface Test Result

Participant	Test Indicator								
	Costumer Form	Land Form	Plantation Form	Monitoring Form	Status Change Form	Income Form	Outlay Form	Income Report	Outlay Report
1	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	×	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	×	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of Participants Who Agree	10	10	10	9	9	10	10	10	10
Percentage	100%	100%	100%	90%	90%	100%	100%	100%	100%

In Table I, there are 10 participants who did the test. Menus that have a 100% approval percentage are Customer Form, Land Form, Plantation Form, namely Income Form, Outlay Form, Income Report and Outlay Report. While the menus that get a percentage of 90% are Monitoring Form and Status Change Form. From the test results, it can be concluded that the system design that has been made has obtained approval from Local Government.

5. CONCLUSION AND SUGGESTION

Desktop-based plantation monitoring information system design results in a database design and a User Interface design. The database design uses a MySQL database, where the result is a plantation.sql database which has several tables, namely customer, land, plantation, plantation_detail, income and outlay. While the User Interface design consists of Main Form, Customer Form, Land Form, Plantation Form, Monitoring Form consisting of Status Monitoring and Status Change, Income Form, Outlay Form, Income Report and Outlay Report. The results of the test on the design of the information system indicate the approval

of Local Government on the system design that has been made.

The results of this study are still in the form of database design and User Interface design. For this reason, it is necessary to develop from design to development of information systems to become ready-to-use system. After that, because this system is desktop-based, the system can still be developed to be web-based or android-based.

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