Monitoring and Evaluation System for Subsidized Fertilizer Distribution (SIMETRI)

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Abstract

Subsidized fertilizer distribution is a government policy to increase agricultural productivity in Indonesia. However, this distribution resulted in inequality and lack of supervision. This causes the distribution of fertilizers that are not on target and uncontrolled. So far, Food Security and Agriculture Department (FSAD) in Bojonegoro has experienced problems controlling the distribution of subsidized fertilizers. These obstacles are due to the unsynchronized data and the lack of extension workers to check directly on the location. Therefore, a monitoring and evaluation system is needed for the distribution of subsidized fertilizers. This system will integrate data from fertilizer distributors, subsidized farmers group, agricultural instructor from sub-districts and the FSAD Bojonegoro can supervise fertilizer distribution. With a monitoring and evaluation system, Agricultural extension officer can monitor fertilizer stocks, thereby minimizing stock shortages and increasing efficiency in the distribution of subsidized fertilizers. And the FSAD can evaluate the distribution fertilizer in Bojonegoro District. The technique used for system development is SDLC (System Development Life Cycle) with Waterfall Model. This system has features such as User Account Verification by Administrator, fertilizer applications from farmer groups, validation of fertilizer by distributors, validation and reset of fertilizer stocks by agricultural instructor officer and evaluate of FSAD Bojonegoro. FSAD Bojonegoro can easily access information regarding the distribution of subsidized fertilizer and evaluate the distribution to performance improvement. System testing has been carried out and the results are that all system performance functions can run well according to their function.

Keywords: Food Security and Agriculture Department (FSAD), *Information System, Monitoring and Evaluation, Subsidized Fertilizer*

1. Introduction

Distribution of subsidized fertilizer is a very important government policy to increase agricultural productivity in Indonesia [1]. Subsidies in the agricultural sector have become a government policy instrument in developing the agricultural sector. The implementation of subsidy policies is carried out to increase farmers' production capacity and is a form of government commitment to realizing food self-sufficiency. Fertilizer subsidies aim to increase food production and farmers' income [2]. In the national budget, subsidies in the agricultural sector are realized in non-energy subsidies consisting of food subsidies, fertilizer subsidies, seed subsidies, PSO subsidies, program credit interest subsidies and tax subsidies borne by the government [3]. In redeeming subsidized fertilizer, farmer/farmer groups are often guided by the fertilizer requirements proposal document or better known as the Definitive Group Needs Plan which is submitted to the regional government, which is not in accordance with the availability of subsidized fertilizer by the central

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government [4]. This has the potential to give rise to a chain of problems, for example the perception of scarcity, considering that the allocation of subsidized fertilizer is often below the proposals put forward by farmers' groups. Another challenge that is seen as adding to the urgency of carrying out a subsidy review is the occurrence of irregularities due to not yet optimal supervision of the implementation of subsidy programs. Monitoring and evaluation of the running of the subsidy program has not been fully optimal [5], so it requires renewal in the digital era like now. The problem that often occurs is the uneven distribution of subsidized fertilizer and the lack of supervision of this distribution [6]. This can cause leaks or distribution that is not on target, so that subsidy funds are not truly beneficial for farmers who need them [7]. Therefore, an effective and efficient monitoring and evaluation system for the distribution of subsidized fertilizer is needed [8]. An information system or application for distributing subsidized fertilizer is a system or application used to manage the distribution and delivery of subsidized fertilizer to farmers [9]. Subsidized fertilizer is a type of fertilizer that is subsidized by the government so the price is cheaper than non-subsidized fertilizer. So far, the problem faced by the Bojonegoro Food and Agriculture Security Service (DKPP) is that the way to monitor the distribution of subsidized fertilizer is still manual, so it is hampered by location, human resources and inappropriate data. With the existence of a monitoring and evaluation system for the distribution of subsidized fertilizer, it is hoped that it can minimize leaks and distribution that is not on target, so that fertilizer subsidies can be truly beneficial for farmers. This system can be developed in the form of a web-based or mobile application. This application can be used by parties involved in the distribution of subsidized fertilizer, such as ministries, fertilizer distributors, agents and farmers who receive subsidies. Applications can provide features such as tracking fertilizer deliveries, reporting stock shortages, and monitoring fertilizer use by farmers receiving subsidies [10]. That way, related parties can easily access information related to the distribution of subsidized fertilizer, and carry out necessary evaluations and improvements. Apart from that, with the monitoring and evaluation application for the distribution of subsidized fertilizer, the government can obtain accurate and up-to-date data regarding the distribution of subsidized fertilizer. This data can be used to optimize the distribution of subsidized fertilizer in the future, and make improvements to distribution and increase the effectiveness of the use of fertilizer subsidy funds. Apart from benefits for the government and farmers, monitoring and evaluation applications for subsidized fertilizer distribution can also provide benefits for fertilizer distributors and agents. With a monitoring and evaluation system, fertilizer distributors and agents can monitor and manage fertilizer stocks more effectively, so as to minimize stock shortages and increase efficiency in the distribution of subsidized fertilizer and ensure that subsidized fertilizer is distributed on time and on target, so that it can help improve agricultural production and farmer welfare.

2. Method

The technique used for system development is SDLC (System Development Life Cycle). SDLC is a multi-level approach to analysis and design using more specific cycles of user activity [11]. This method provides stages that can be used as a guide to develop the best system because the system is analyzed and designed before use and the needs of system users can be determined precisely [12]. The SDLC waterfall model is a methodology for designing and building software systems, namely the design process gradually flows downwards. The system development model is waterfall. The waterfall model is a software development model that is often used. This development model takes a systematic and sequential approach. It is called a waterfall because the stages you go through must wait for the completion of the previous stage and run sequentially. The method used is a sequential method like a waterfall [13], [14], [15], [16]. This development model is linear from the initial stage of system development, namely the planning stage, to the final stage of system development, namely the maintenance stage. The next stage will not be implemented before the previous stage has been completed and cannot be returned or repeated to the previous stage. The stages carried out are:

1. *Requirement*

At this stage, requirements for get information about the system requirements needed in FSAD Bojonegoro District. Communication is carried out which aims to understand the software that users expect and the limitations of the software. Prepared a requirement for the user to analize to develop the system. The Activities include identifying problems encountered during system realization, identifying data and information needs, as well as hardware and software needs.

2. *Design*

At this stage, a system is designed to help determine the user level. So that it helps in defining the overall system architecture. The activities in this stage include system design, database design and interface design.

3. *Implementation*

At this stage it is developed into a program, which is integrated in the next stage. System Implementation creates an information system for monitoring and evaluating subsidized fertilizer using PHP and MySQL. PHP is a programming language that functions to create dynamic websites and web applications [17]. While MySQL is a common type of database server. MySQL uses the SQL language to access its database [18].

4. *Testing*

Each unit is developed and tested for functionality which is called unit testing. Testing to ensure that the system created functions as expected. Testing uses the black box method. This system testing is carried out to check for possible errors.

5. *Maintenance*

In the final stage is maintenance. The finished software is run and maintained. Maintenance includes correcting errors that were not found in the previous step. This step includes backing up the data that has been taken so that if one day the information system experiences degradation in the system, the system can be restored to its original state.

3. Result and Discussion

Results and discussion explain system requirements, user-centered design analysis, system implementation, system testing and evaluation.

Requirement Analysis

The requirement for a system at FSAD Bojonegoro to monitor and evaluate the distribution of subsidized fertilizer. The system can carry out evaluations of fertilizer distributors in each sub-district. With this system, FSAD also monitors agricultural instructors when supervising the distribution of subsidized fertilizer to farmer groups. Some of the features that this system can have include:

1. User registration: Users such as Farmer Group, Distributors, agricultural instructor can register to the system and Validated by Administrator from FSAD Bojonegoro District.
2. Submission of subsidized fertilizer quota: Farmers can apply for the subsidized fertilizer quota they need through the system or application.
3. Management of subsidized fertilizer stocks by Distributors: Distributors can manage available subsidized fertilizer stocks.
4. Monitoring of subsidized fertilizer: Agricultural instructors can monitor the distribution of subsidized fertilizer.
5. Evaluation the use of subsidized fertilizer: Food Security and Agriculture Department can monitor the distribution of subsidized fertilizer in Bojonegoro.

Design Analysis

This step is a procedure on the website. Apart from that, user identification and FSAD are carried out to determine the parties involved in system development. At this stage, the focus is placed on designing the database system seen in Figure 1, the need for tables in the database and the users

who will use this system. There are 5 users, namely: Administrator from FSAD Bojonegoro, Distributor, Farmer Group, Agricultural instructor, and head of FSAD Bojonegoro. Administrator who manages master data on the system. Distributors are parties who are trusted to buy and sell fertilizer to farmer groups. Farmer groups are the parties who buy fertilizer. Agricultural instructors are Verifiers from the department to supervise the distribution of fertilizer. Meanwhile, FSAD is the agency that monitors and evaluates the distribution of fertilizer in Bojonegoro.

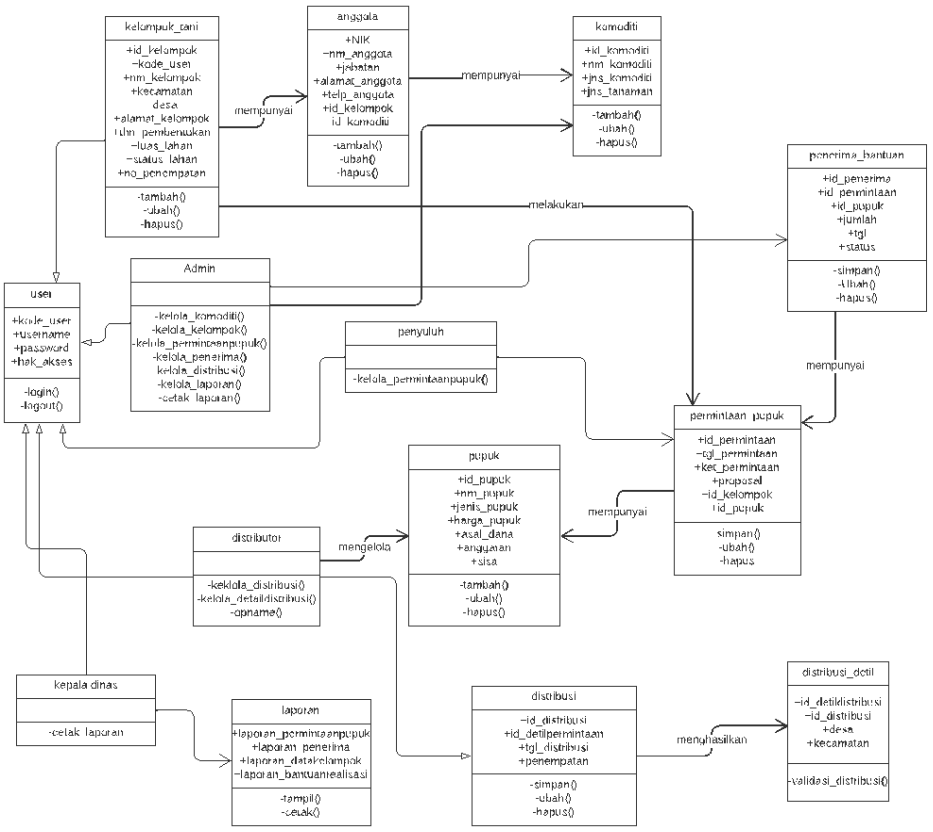


Figure 1. Design Sistem

Implementation system

The design that has been implemented into the SIMETRI system. The login page where each user has their own username and password. Figure 2 shows the system's main page.

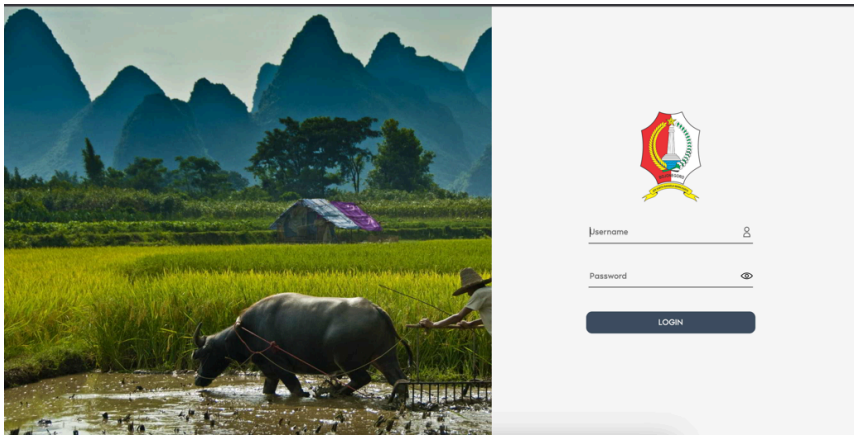


Figure 2. Login Page

Administrator creates master data such as the accounts of agricultural instructors, distributors, farmer groups and the FSAD Bojonegoro as shown in Figure 3.

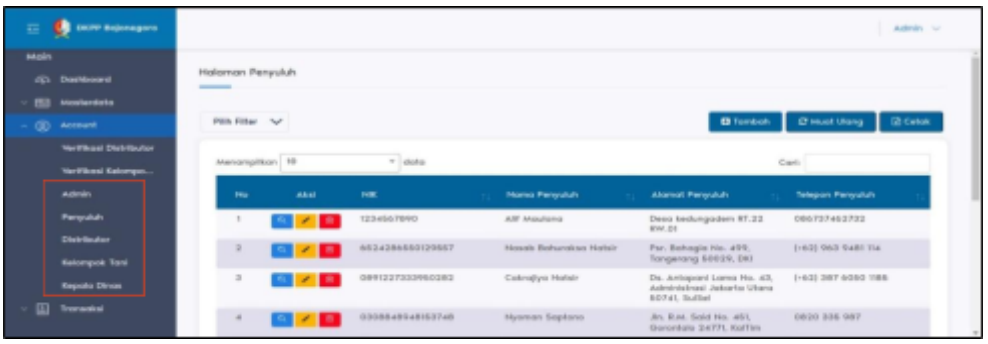


Figure 3. Administrator View

Apart from that, Administrator can verify Distributor and Farmer Group Accounts as shown in Figure 4.

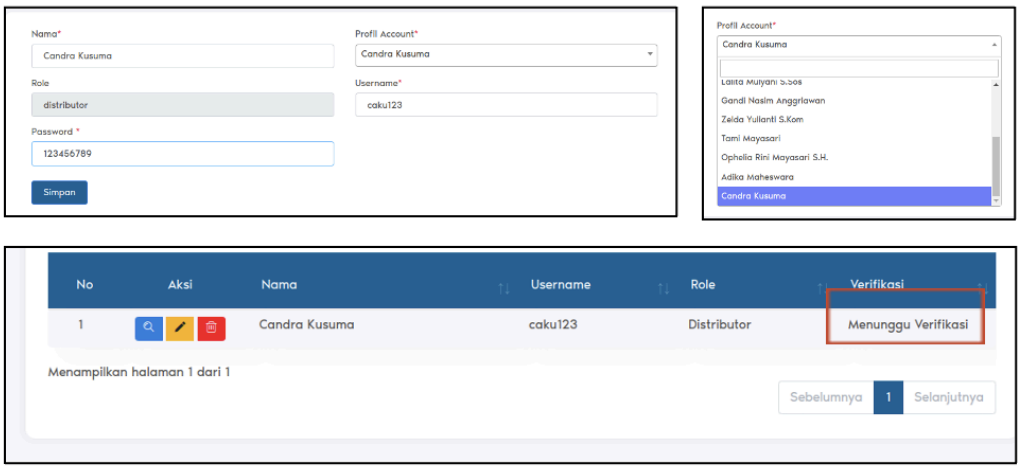


Figure 4. Administrator Verification View

Agricultural instructors can verify fertilizer quotas from distributors as seen in Figure 5 and reset existing fertilizer quotas in Bojonegoro district as seen in Figure 6.



Figure 5. Fertilizer Quota Verification

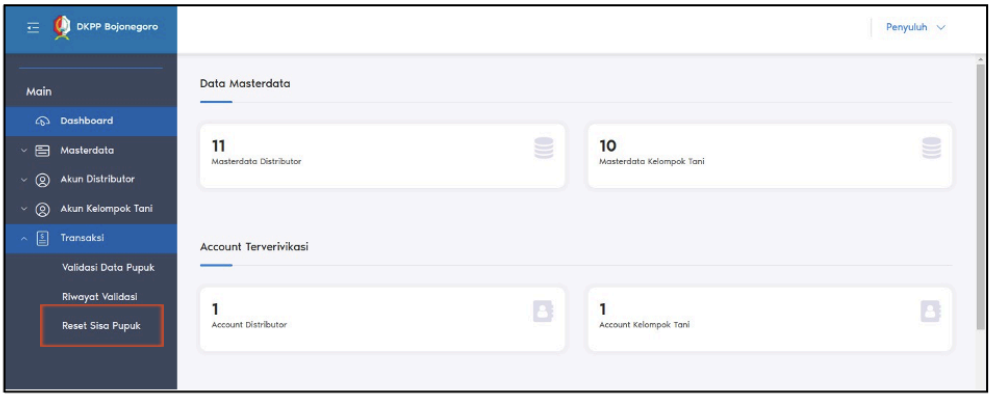


Figure 6. Reset Fertilizer Quota

Fertilizer applications can only be made by accounts that have the role of farmer group as seen in Figure 7.

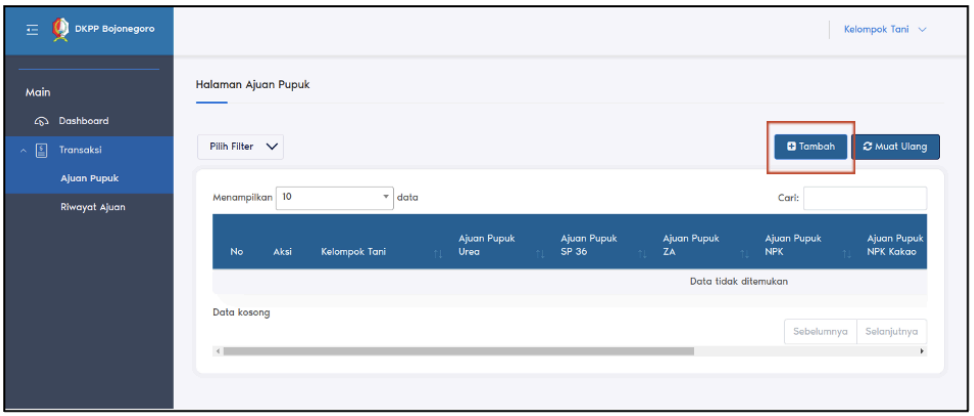


Figure 7. Farmer Group Fertilizer Application

Distributors can validate fertilizer proposals from Farmer groups as seen in Figure 8.

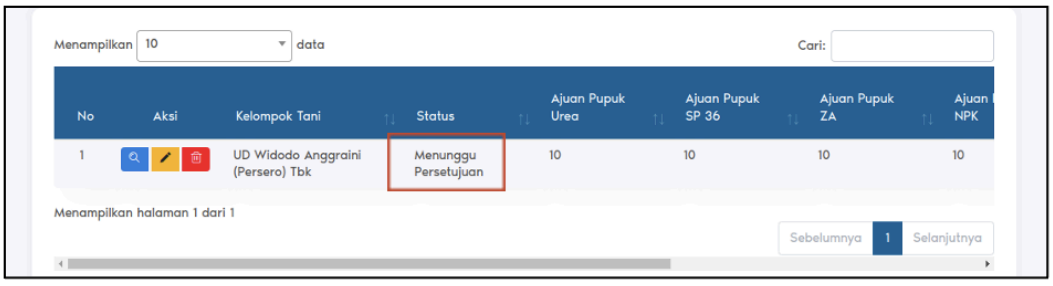


Figure 8. Distributor Validation

Testing and Evaluation System

After the implementation stage, a trial was carried out using the black box testing method. The black box testing method is also known as functional testing, which is testing software without knowing the internal structure of the code or program. In black box testing is carried out based on application details such as application appearance, application functions and suitability of the function flow to the business processes desired by the customer. From the tests that have been carried out, it is

hoped that the system can function well so that it is easy for users to use. The test results are shown in Table 1.

Table 1. Test Result

Tested Activities	***Test Condition***	***Expected Results***	***Test Result***
Login	Enter username and password for access to the main page to start operation of website.	Go to the main page each account	success
Verify the Account by Administrator	Verifying user accounts for agricultural instructor, distributors, farmer groups and FSAD	Account can be verified	success
Farmer Group Requests Fertilizer Quota	Inputting Fertilizer Requests to Distributors	The Fertilizer Quota can be seen by the Distributor	success
The distributor validates ertilizer application from farmers' group.	Validating Fertilizer Applications from Farmer Groups	Applications can be validated	success
The agricultural instructor validates and resets fertilizer for distributors.	Validating and Resetting fertilizer for Distributors	Applications can be validated or rejected	success

4. Conclusion

From the results of the system testing the conclusion of the monitoring and evaluation system is that the system processes can run well and according to requirements. This system includes User Account Verification by Admin, fertilizer applications from farmer groups, validation of fertilizer by distributors, validation and reset of fertilizer stocks by extension workers. This system makes it easier for extension workers and the FSAD to monitor and evaluate the distribution of subsidized fertilizer in Bojonegoro Regency. In this research, system testing has also been carried out using the Black Box method. As a result of this system testing, all system performance functionalities can run well according to their function.

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