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DESIGN AND BUILD A CLEAN WATER SERVICE INFORMATION SYSTEM (CASE STUDY OF THE DOWN CIASEM VILLAGE)

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Abstract

PAMSIMAS in Hilir Ciasem Village has customers that include residents of Hilir Ciasem Village. In managing customer data, the calculation of bills and payment of water bills are now still done manually. The purpose of this research is to build a web-based information system with PHP programming language and MySQL database as data storage. The design method in this study uses the System Development Life Cycle (SDLC) waterfall model. A clean water service information system is produced that can store data, manage customer data, and make payments easily. Testing is done using the Blackbox and UAT methods given to 3 respondents. The test results showed that the application is running as expected with a 100% success rate for Blackbox testing and 82% for the average UAT testing value. It showed that this application can overcome existing problems related to clean water services in PAMSIMAS Hilir Ciasem Village, Subang district.

Keywords: Information Systems, Services, Websites, PAMSIMA

INTRODUCTION

Provision of Community-Based Drinking Water and Sanitation (PAMSIMAS) is one of the government programs engaged in providing clean water and sanitation services for people in rural areas (Nurul Fitriyani and Mardwi Rahdiawan, 2016). The customer service process of PAMSIMAS Desa Ciasem Hilir which is currently being implemented has several problems, namely the possibility of data loss, damage to data recording, delay in the calculation process, the need for customers to come to the village office. Apart from that, long distances, long queues, telephone charges and long staff responses are the main problems because the process takes a long time so it is very ineffective and inefficient.

Based on the problems that occur, a new system is needed that can improve the quality of customer service for PAMSIMAS Ciasem Hilir Village customers. In this designed system, officers can input the customer's water usage which will later be calculated into the customer's water bill. Admin can manage customer data, bill calculation, and customer monthly bill payments quickly and easily. In addition, customers can check their monthly bills anywhere and anytime online and in real time.

METHOD

The waterfall model or what is often called the waterfall model is one model of the System Development Life Cycle (SDLC) system development life cycle that is widely used. In general, this model has 5 different stages, including Requirement Analysis, System Design, Implementation, Testing, Maintenance (Sommerville, 2011). In making this system, the authors modify several parts of the completion process. The purpose of using this

method is to make a clean water service information system well structured. The completion process can be explained as follows.



Figure 1. Settlement Methodology

System analysis is carried out by collecting SOP documents and interviews to produce business process documents that are already running without an information system. Furthermore, the system design is made using UML (Unified Modeling Language) modeling which will produce Use Case Diagrams, Class Diagrams, Activity diagrams and Squence diagrams. Database system design is done by making an ERD (Entity Relationship Diagram) with the aim of explaining the relationship between data in the database based on database objects that have relationships between relationships.

At the implementation stage the programming language used is PHP (Hypertext Prepocessor) with the Codeigniter Framework which contains a collection of code structures that can make it easier to solve a problem. The last stage is testing using Blackbox and UAT (User Acceptance Testing). Blackbox testing is required to be able to answer several questions regarding the functional validation being tested. UAT testing is a testing process carried out by the user so as to produce documents to be used as evidence that the developed application can be accepted by the user and the test results are considered to meet the user's needs (Cholifah et al., 2018).

RESULTS AND DISCUSSION

The running system is described through a flowchart as a process sequence by connecting between processes or instructions in other processes in one program. Flowchart of the running service handling process can be defined in Figure 2.



Figure 2. Flowchart of New Customer Registration



Figure 3. Payment Flowchart



Figure 4. Reinstallation Flowchart

Result

Based on the descriptions described above about the running system, the authors propose that the Clean Water Service Information System needs to do a more structured system design for each user / division by defining it through UML (Unified Modeling Language (UML) modeling, namely Use Case Diagrams,



Activity Diagrams, Sequence Diagrams, and Class Diagrams.

Figure 5. Use Case Diagram

The actors involved in this system can be classified into three actors, namely officers, admins, and customers. For clarity, the roles of actors in the system can be seen in Table 1.

Actor	Description		
Officer	Have access rights to input water meter usage for each customer.		
Admin	Have access rights to manage officer data, customer data, tariff data, bill management, manual payments, online payment verification, and manage reports.		
Customer	Has the right to change the password for his account, get notifications about incoming bills, check the size of bills, and can make bill payments online.		

Based on the use case scenario, the activities that occur or the workflow in the use case can be described as in Figure 6.



Figure 6. Activity Diagram of Recording Water Meter

The activity diagram shows the bill size of each customer.



Figure 7. Online Payment Activity Diagram

The interaction between objects needed to run a use case, in capturing the interaction of these objects using a Sequence Diagram which is described as follows.



Figure 8. Sequence Diagram for Recording Water Meter



Figure 9. Bill Check Sequence Diagram

Based on the Sequence Diagram above, officers can select customers to record the water meter. A Request Index message based on selected customer_id is sent to the billing controller and redirects to the billing view. The clerk selects the add bill button and displays a pop-up to be filled in for the amount of use by the officer. The clerk can click the save button to continue or cancel to cancel.

Class diagram illustrates the structure of the system in terms of defining classes that are made to build a system. The class diagram of the clean water service information system in Ciasem Hilir village can be seen in Figure 10.



Figure 10. ERD Class Diagram

This class diagram is used to describe the system structure in terms of defining the classes that will be made to build the system



ERD is also used to model data structures.



Figure 12. Database Design

Discussion

The following is the result of the implementation of the clean water service information system in Ciasem Hilir village:



Figure 13. Login Page

On the login page, there is a text file in the form of a username and password that is entered by the user to access the clean water service information system in Ciasem Hilir Village. If you don't have an account, new users can register so that registration for new installations no longer requires customers to come to the PDAM office and queue (Effan, 2016).

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Copyright C 2019 Dania, KI Highla Inter Vel.		Version 1.0

Figure 14. Main page

On this page, officers can search for and select customer data to be inputted using.

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Laporan	Showing 1 to 2 of 2 entries Provides	1 Not				
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Figure 15. Billing page

This page is a page of incoming invoice data, where when the clerk inputs the customer's usage, the results of the input will be entered into this page with automatic calculation and displays the bill size and total that the customer must pay in detail. Before the existence of an information system such as information on the water usage stand meter numbers that have been used and payment bills, even notification information was still manual based, namely customers had to come to the head office and payment counters (Fitriana, 2016). With the creation of this clean water service information system, the system is sufficient to meet the requirements of an ideal system with 3 users, namely field admin, power user admin and office admin. however, this application cannot be run on mobile devices for field officers (Prasetyo, 2018).

System or application testing is carried out using the blackbox testing method. This test is intended to determine whether the output generated from system processing actually matches the output expected by users of the application system. This test focuses on testing the functionality of the system before carrying out the UAT and the authors perform blackbox testing with three testers with the overall test results successful with valid data. Furthermore, UAT testing is carried out by users by filling out a questionnaire in which the number of respondents is 3 people with 8 questions each.

No	Pertanyaan	Α	B	С	D	E
1	In your opinion, is the appearance of the front-end website of the Ciasem Hilir Clean Water Service Information System attractive?	1	2			
2	In your opinion, are the menus of the Ciasem Hilir Clean Water Service Information System website easy to understand?	1		2		
3	In your opinion, is the layout of the Ciasem Hilir Clean Water Service Information System website good enough?		3			
4	In your opinion, is the accessibility of the Ciasem Hilir Clean Water Service Information System website easy enough?		1	2		
5	In your opinion, are the features of the Ciasem Hilir Clean Water Service Information System website easy to understand?		1	2		
6	In your opinion, does the Ciasem Hilir Clean Water Service Information System website make it easy to record, manage, and pay water bills?	1	2			
7	In your opinion, will the Ciasem Hilir Clean Water Service Information System website be sufficiently helpful in the process of managing customer data, billing, and monthly water payments?	3				
8	In your opinion, is there a need for a website for the Clean Water Service Information System in Ciasem Hilir Village?	3				

Table 2.	UAT	Assessment	Categories
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Based on the test results above, it can be stated that this system is fairly good with an average value of 82%.

CONCLUSION

Based on the results of the design that has been done with UML diagrams and implementation using a codeigniter framework, a clean water service information system is produced. Furthermore, blackbox testing and UAT testing are carried out to evaluate the system, so that the authors draw the following conclusions. 1. The website-based information system built can store water usage data from the customer's water meter so that it can avoid data loss and damage. The successful implementation of the system can be seen from the results of blackbox testing that has been carried out by user officers with a success percentage of 100%. 2. This information system can manage customer data and calculation of monthly customer water bills automatically. The successful implementation of the system can be seen from the results of blackbox testing that has been carried out by the admin user with a 100% success percentage. 3. This system is able to display monthly bill details and is able to make monthly bill payments via online proof uploading without having to come directly to the village office. The success of system implementation can be seen from the results of blackbox testing that has been carried out by customer users with a success percentage of 100%. 4. This system is quite attractive and easy to use, as evidenced by the results of UAT testing conducted by 3 users, namely officers, admins, and customers with 8 questions provided and obtaining an average value of 82%. It can be concluded that the system developed is suitable for use with a high enough level of comfort so that it is in accordance with user needs.

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