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Web-based Customer Service Information System at UPTD PAB Taluk Kuantan

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ABSTRACT

The Regional Technical Implementation Unit for Clean Water Providers (UPTD PAB) in Taluk Kuantan is a specialized entity tasked with the implementation of the Drinking Water Supply System (SPAM). However, the delivery of these services has not been supported by an efficient service system, both in terms of timeliness and security. The service system at UPTD PAB Taluk Kuantan is still being conducted in a conventional manner. This means that every customer is required to visit the UPTD PAB Taluk Kuantan office in person to access services, such as registering as a new prospective customer with a PAB officer, requesting clean water installation through a PAB officer, obtaining official information regarding the availability of clean water through written announcements. In the event of water flow-related issues, customers must either visit the office in person or contact the officer directly by telephone. Additionally, when it comes to bill payments, customers are required to make payments in person at the PAB office. The UPTD PAB Taluk Kuantan perceives the existing system or method as inefficient due to frequent lapses in officers' responsiveness in addressing customer complaints. Furthermore, the management of customer data reports and transaction data at UPTD PAB Taluk Kuantan lacks proper coordination, as these reports and data are still manually handled using computer applications such as Microsoft Word and Excel. To address this issue, an information system is required that can receive customer reports and disseminate information to customers. This information system will simplify the process for customers to register as new prospective customers and access official information about the availability of clean water without the necessity of visiting UPTD PAB Taluk Kuantan in person. With the implementation of this system, information and data can be effectively managed, enabling prompt responses to customer complaints without requiring them to visit the office for resolution. It is anticipated that this information system will facilitate UPTD PAB Taluk Kuantan employees in delivering more effective and efficient services to their customers and generating more streamlined reports.

Keywords: *Customer, Information System, Service, Website.*

Introduction

The UPTD PAB (Regional Technical Implementation Unit for Clean Water Provision) in Taluk Kuantan is a specialized entity established by the Kuantan Singingi Regency government to oversee the execution of the SPAM (Drinking Water Supply System). Its primary responsibility is to undertake operational tasks and provide technical support related to the infrastructure required for clean water provision. The functions of UPTD PAB Taluk Kuantan encompass the collection and purification of water, ensuring its clarity, and subsequently distributing it to the local community or its customers.

Nevertheless, the delivery of these services has not been bolstered by an efficient service system in terms of timeliness and security. The service system employed by UPTD PAB Taluk Kuantan still adheres to conventional practices. Specifically, each customer is required to personally visit the UPTD PAB Taluk Kuantan office to access various services, including registering or enrolling as a prospective new customer with a PAB officer, submitting requests for clean water installation to a PAB officer, and obtaining official information regarding the availability of clean water through written announcements. In cases where issues related to water flow arise, customers must either visit the office in person or contact an officer directly by telephone. Moreover, when it comes to bill payments, customers are obliged to make payments directly at the PAB officer's office. UPTD PAB Taluk Kuantan perceives this system or method as inefficient due to the frequent neglect exhibited by officers in addressing customer complaints.

In the context of customer data reports and transaction data management at UPTD PAB Taluk Kuantan, there is currently a lack of effective coordination. This deficiency arises from the fact that reports, as well as customer and transaction data, are still being handled manually, primarily relying on computer applications like Microsoft Word and Excel. A system is defined as a collection of interconnected or integrated components designed to accomplish a particular objective. For instance, within a system, any components that do not contribute to the achievement of the same objective are not considered part of the system. A system can

be described as a network of interconnected procedures assembled to carry out tasks or accomplish a specific goal [1].

Information is data that has undergone processing to take on a format that holds value for the receiver and proves beneficial in every decision-making process [2]. Input data undergoes processing to yield output data in the form of information. However, processed data may not immediately transform into information; instead, it is initially stored in a repository known as a Database. Furthermore, information is not solely generated from freshly entered data; it can also stem from data already existing within the database or information derived from the amalgamated outcomes of stored data combined with newly input data. [3]

An information system is a system within an organization that fulfills the requirements of daily transaction processing, supports operational, managerial, and strategic functions within the organization, and delivers essential reports to specific external stakeholders [4**] .** An information system is a system within an organization that meets the needs of daily transaction processing, supports operations, is managerial and strategic activities of an organization, and provides certain external parties with the necessary reports [5].

Website is a collection of *web pages* along with supporting files, such as image files, videos, and other digital files that are placed (hosted) on a web server that can generally be accessed via the internet [6]. Web is a type of collection service related to document documents stored on the internet and accessed using the *Hypertext Transfer Protocol* (HTTP) protocol which will produce information facilities or documents that can be accessed, can be data, text, images, sound, video with the need for an internet web browser to write addresses on *Internet Explorer, Netscape, Opera, Mozilla Firefox,* and *Google Chrome*" [7].

In the digital era, digital information systems are undoubtedly well-known to the public. A digital information system represents a transformation from a manual system to an automated one. This transition undoubtedly enhances the effectiveness of the management system, which was previously susceptible to errors due to its reliance on human capabilities alone. Hence, the utilization of digital information systems proves to be highly advantageous in addressing this issue. Digital information systems play a pivotal role in enhancing the effectiveness and efficiency of the service system.

The implementation of this information system will simplify the process for customers to register as new prospective customers and access official information regarding the availability of clean water without the necessity of visiting UPTD PAB Taluk Kuantan in person. Moreover, this system enables proper management of information and data, facilitating swift responses to customer complaints without requiring them to physically visit the office for resolution. Consequently, it is anticipated that this information system will streamline the ability of UPTD PAB Taluk Kuantan employees to deliver more effective and efficient services to their customers, as well as generate more effective reports. Given the issues outlined above, it is imperative to update the computerized information system to enhance service quality and customer satisfaction. This modification will result in more effective management of information and data, with expedited responses to customer complaints without necessitating office visits. Therefore, the author proposes the title "Customer Service Information System at UPTD PAB Taluk Kuantan based on the web."

Research Methodology

The following is a description of the flow of this research, which can be seen in Figure 1.

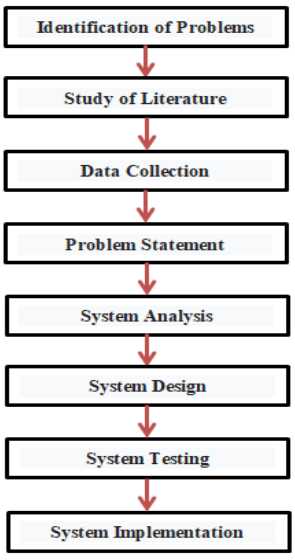

Figure 1. Research Methodology

Figure 1 depicts the Research Methodology employed in this research. Based on this workflow, the research utilizes the *Research and Development* approach. In this research, the resulting product is a service website for UPTD PAB Taluk Kuantan. In constructing a system, accurate data is necessary in accordance with the conducted research. The data collection methods used are as follows:

Observation

Observation is the foundation of all scientific knowledge. Scientists can only work based on data, which are facts about the real world acquired through observation [7]. At the beginning of the qualitative research, observations were made during the grand tour observation. The observation method used is in the form of direct observation or sensing of an object, condition, situation, process, or behavior [8]. The researcher conducted direct observations of the customer service process at UPTD PAB Taluk Kuantan.

Interview

An interview is a meeting between individuals to exchange information and ideas through questions and answers, thereby constructing meaning within a specific topic [7]. An interview is a conversation with a specific purpose by two parties, namely the interviewer as the asker/giver of questions and the interviewee. (interviewee) as the answerer to the question [9]. In a study there are two types of informants, namely, Key informants and Informants. Key informants are the core sources in research. Key informants are important in research because they know more information from the research that the researcher will conduct. Then the informant is a supporting resource in the research [10]. The researcher conducted direct interviews with several employees and customers at UPTD PAB Taluk Kuantan.

Documentations

Documents are records of past events. Documents can be in the form of writing, images, or someone's monumental works [7]. Documentation is a data collection technique that is not directly aimed at research subjects. The documents examined can be official documents such as decision letters, letters of instruction, while unofficial documents such as memorandums and personal letters can provide supporting information about an event [11]. In research documentation is a complement to observation and interview methods.

The collected data is then subjected to specific analysis techniques, namely:

Analysis of Functionality Aspect

The Functionality aspect is a testing aspect that focuses on the functional requirements of a system or software. By calculating the number of functional features contained in the application, testing can be done, then a comparison is made with the functional features that have been successfully implemented [12]. The analysis of the *functionality* aspect is conducted by testing each software function by respondents or experts. To determine the feasibility level of the functionality aspect, the following formula is used:

$$\boldsymbol{x = 1 - \frac{a}{b}}$$

Where:

x = Functionality

α = Total number of invalid functions

b = Total number of functions

Interpretation of the measured values in the formula is ($0 \leq x \leq 1$). An application can be considered "good" in terms of its functionality aspect if the obtained value of x approaches the number 1. [8]

Analysis of Usability Aspect

Usability testing is a category of methods in usability evaluation that observes users of a design and then takes data and analyzes it. Typically, during a test, participants will try to complete tasks, while observers watch, listen, and take notes. The goal is to identify usability problems, collect qualitative and quantitative data and determine user satisfaction with the product. In relation to the development stages of an application, usability testing is an activity carried out iteratively to obtain a comprehensive response from users [13]. The analysis of the *usability* aspect was conducted on 10 respondents who are users of the PAB UPTD Taluk Kuantan information system, consisting of customers and employees of UPTD PAB Taluk Kuantan. The formula used is as follows:

$$\boldsymbol{Index = \frac{Total\ Score}{Maximum\ value \times number\ of\ respondents} x100}$$

To determine the quality of the system, the predefined category table is utilized. The assessment categories can be observed in the following table: [8]

Table 1. Usability Factor Evaluation Categories

Interval	Category
0% – 20%	Very Inappropriate
21% - 40%	Inappropriate
41% - 60%	Moderately Appropriate
61% - 80%	Appropriate
81% - 100%	Very Appropriate

Results and Discussion

1. System Implementation

System testing will depict how a system function effectively. This testing phase encompasses the execution results of the program and explanations of the program developed to support the designed system [14]. To carry out the implementation activities and follow-up, the designed application program requires a computer tool, where operating the computer itself necessitates three supporting components: *hardware, software, and brainware.*

2. Application View

System testing is conducted to assess the system's ability to address issues and establish the relationships between its components. This testing phase encompasses the outcomes of program execution and explanations of programs created to support the designed system.

a. Login Form and Registration page.

The login form is used to log in and display the main menu based on the user level, where in this form the user or user of the program must fill in the username and password, then click login to be able to use the system, for more details, it can be seen in Figure 2.On this registration page, potential customers have the option to sign up as new users to access this Information System. When registering, prospective customers are required to provide the data requested by the system. For additional details, please refer to Figure 3.

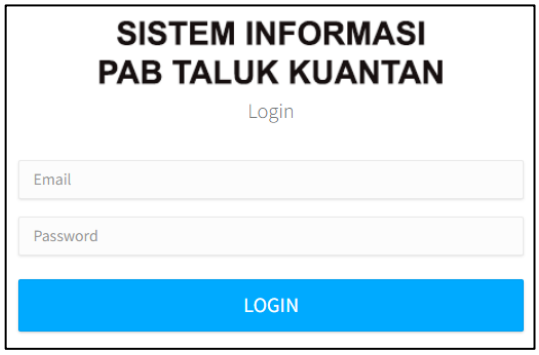

Figure 2. Login form

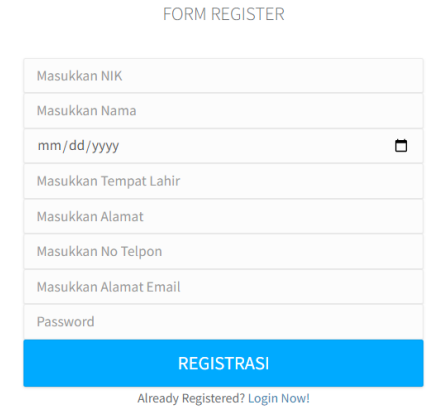

Figure 3. Registration page

b. Forgot Password page.

On this page, users have the option to request a forgotten password or reset their password by entering the email address that is registered in the system. For further details, please refer to Figure 4.

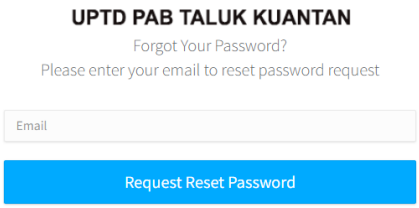

Figure 4. Display Forget Password

c. Admin Page and Customer Data Page Display

The Admin Main page features several menus providing information on Customer Data, Installation Data, Payment Data, Complaint Data, Village Data, and District Data. For further details, please refer to Figure 5.

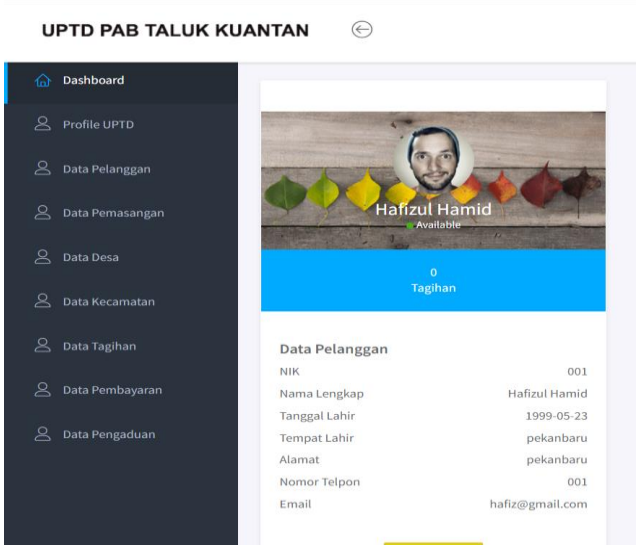

Figure 5. Admin Main Page Display

On the customer page there is information about customers registered in the system, in this customer page, the system admin can input or add customer data, edit customer data, and delete customer data. For more details can be seen in Figure 6.

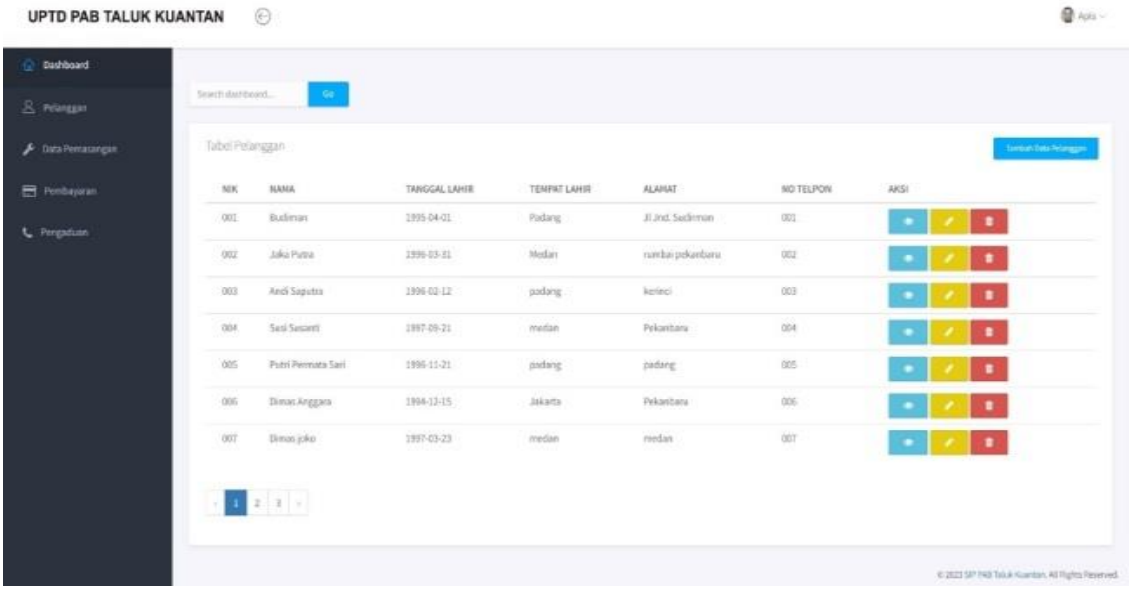

Figure 6. Customer Page Display

d. Display Input, Edit and Profile View Customer

On this page for inputting customer data, the administrator can enter supplementary customer information. For more detailed information, please consult Figure 7. On this page for editing customer data, the administrator can make modifications or updates to customer information. For more comprehensive information, please refer to Figure 8. The administrator can access and view the customer data profile. For additional details, please refer to Figure 9.

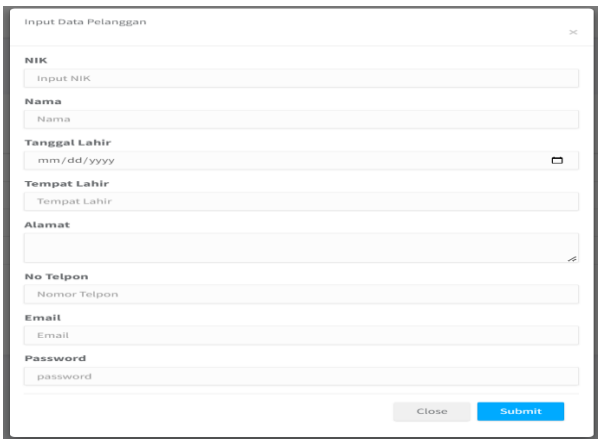

Figure 7. Customer Data Input Display

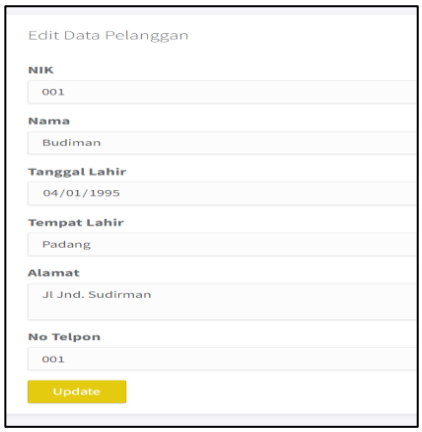

Figure 8. Display of Edit Customer Data

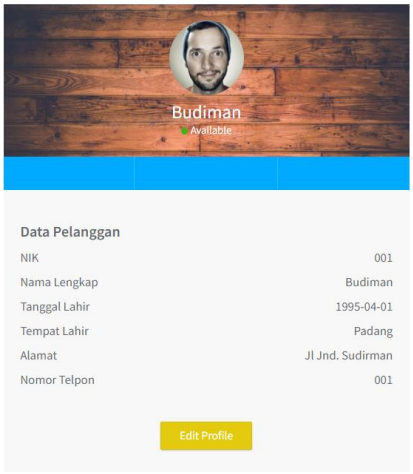

Figure 9. Customer Profile Display

The installation page contains information regarding the installation data stored in the system. Within this installation page, the system administrator has the capability to input or add installation data, edit existing installation data, and delete installation data. For further information, please consult Figure 10.

Figure 10. Installation Data Display

Display Input and Edit Installation Data

On this page for inputting installation data, the administrator can enter additional installation information. For more detailed information, please refer to Figure 11. On this page for editing installation data, the administrator can make updates to the installation information. For further details, please refer to Figure 12 below.

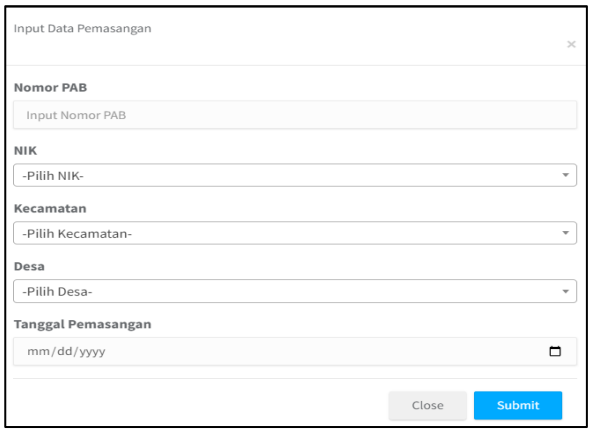

Figure 11. Installation Data Input Display

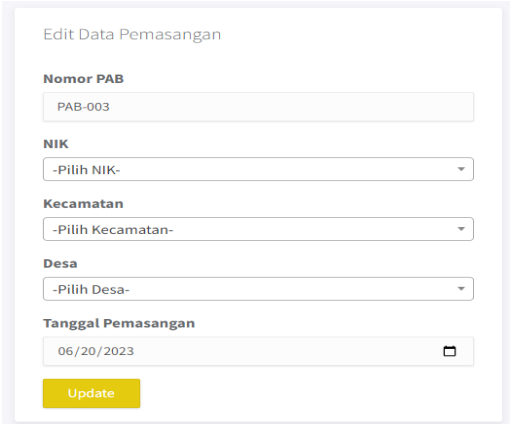

Figure 12. Display of Edit Installation Data

Bill Page Display

This bill page contains billing data for each customer, organized according to the monthly billing period. For additional details, please refer to Figure 13 below.

Figure 13. Bill Data Display

Bill Data Input Display

On this bill page, the administrator enters the bills for each customer in accordance with the monthly billing period. For further information, please refer to Figure 14 below.

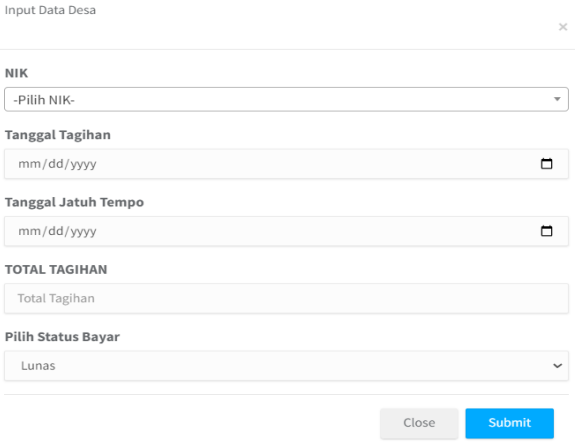

Figure 14. Bill Data Input Display

Display Edit Bill Data

On this bill page, the admin updates each customer's bill if there are changes to the bill. for more details can be seen in Figure 15 below.

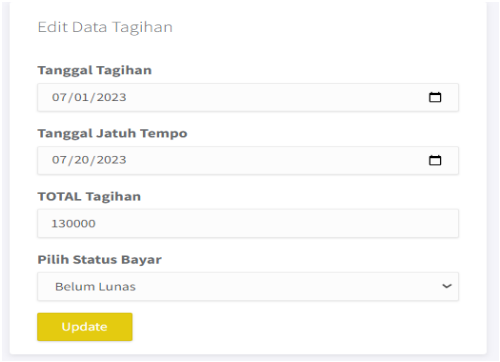

Figure 15. Bill Data Input Display

Payment Page Display

The payment page contains information regarding payments made by customers in the system. For further details, please refer to Figure 16 below.

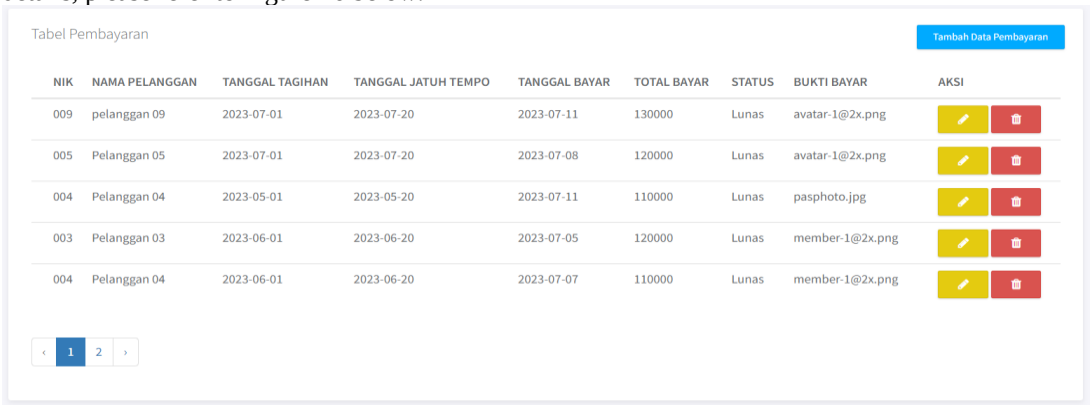

Figure 16. Payment Data Display

Payment Status Update Display

On this "Update Payment Status" page, the administrator updates the payment status from "Unpaid" to "Paid". For more detailed information, please consult Figure 17 below.

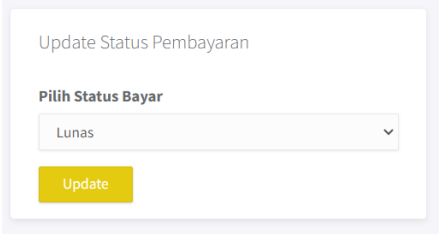

Figure 17. Payment Status Update Display

Complaint Page Display

On this page, the administrator can view the complaint data submitted by the customers. For additional details, please refer to Figure 18 below.

Figure 18. Display of Complaint Data

e. Customer Page

Customer Home Page Display

The Customer Main page features several menus, including UPTD Profile, Billing, and Complaint Form. For further information, please consult Figure 19 below.

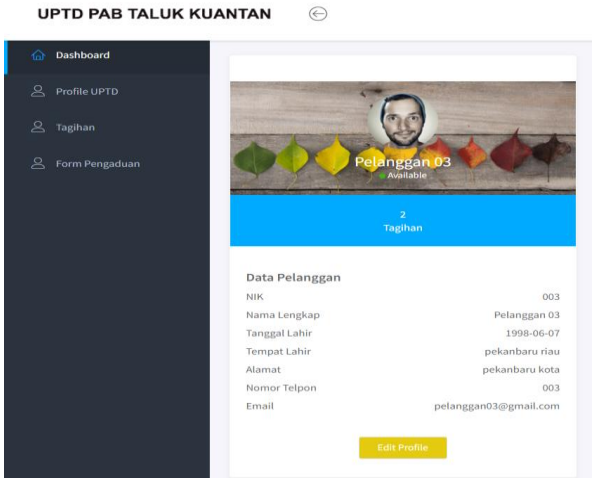

Figure 19. Customer Page Display

Bill Page Display

The Customer Bill Page houses customer billing information. On this page, customers can access their monthly bills, review bill details, examine invoices, and confirm bill payments. For further information, please refer to Figure 20 below.

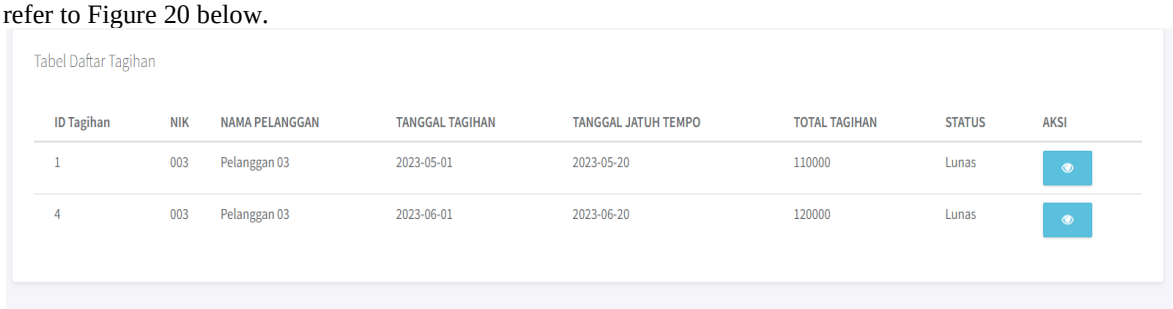

Figure 20. Customer Bill Display

Bill Detail View

This page presents the specifics of customer bills for each billing period, allowing customers to examine invoices and confirm payments. For additional information, please refer to Figure 21 below.

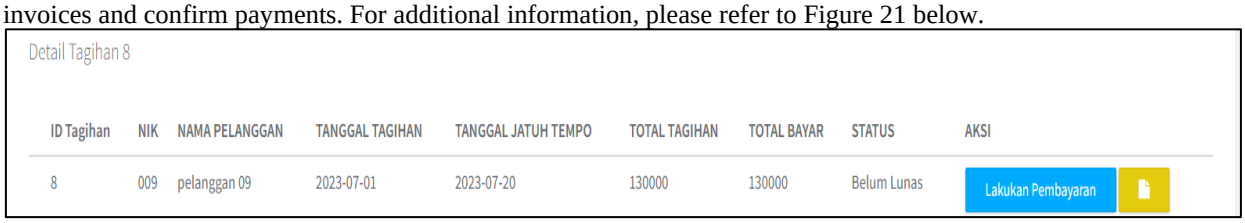

Figure 21. Customer Bill Display

Invoice View

On this invoice page, customers can see the invoice bill that must be paid, for more details can be seen in Figure 22 below.

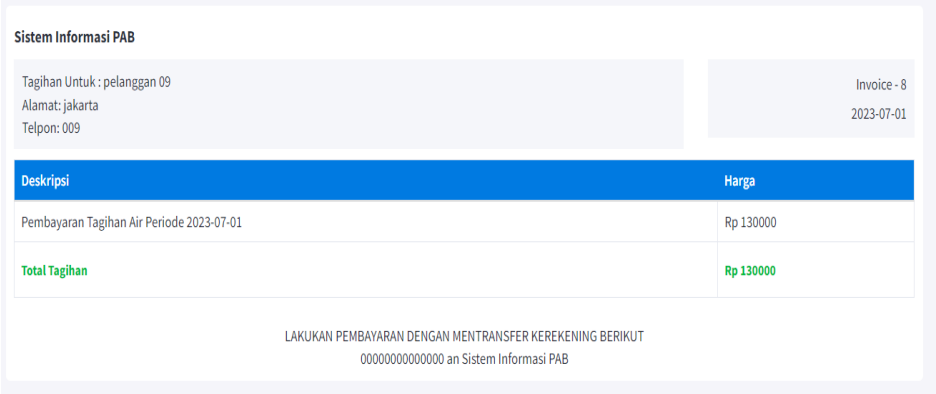

Figure 22. Bill Invoice Display

Payment Confirmation Display

On this page customers can confirm payments that have been made by customers, for more details can be seen in Figure 23.

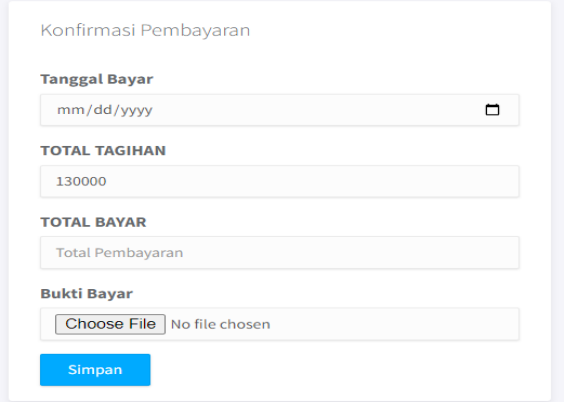

Figure 23. Payment Confirmation Display

Complaint Form Page

This page comprises data regarding the history of customer complaints. Customers can submit complaints or grievances to UPTD PAB using this system. For more comprehensive information, please refer to Figure 24 below.

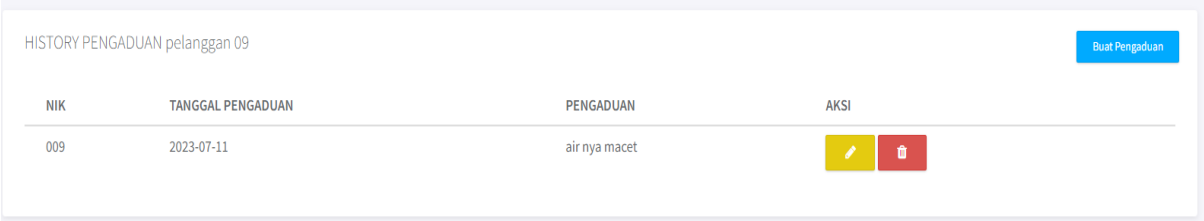

Figure 24. Complaint Page Display

Complaint Input Display

Customers have the option to file complaints with UPTD PAB Taluk Kuantan in case of any disruptions. For additional information, please refer to Figure 25 below.

Figure 25. Display of Complaint Input

3. System testing

System testing is the process of executing software to determine whether the system conforms to the system's specifications and operates within the desired environment. Testing is performed by examining each process and potential errors that may occur for each [15]. The system testing methods employed include Black Box and Usability testing.

Blackbox Testing

Table 2. Blackbox Testing User Admin

Menu	Desired Output	Displayed Results	Status
Login Form	Displaying a form to input the correct username and password. If incorrect, the user will be prompted to enter the correct username and password.	If the username and password are correct, the user successfully logs into the system. If incorrect, the user is prompted to re-enter the correct username and password.	Valid
Input Customer Data by Admin	Displaying a form to fill in the National ID (NIK), Full Name, Date of Birth, Place of Birth, Address, Phone Number, Email, and Password for system login.	The system would store customer data in the database if the data entered in the Add Customer Data form complies with the system's requirements.	Valid
View Customer Profile by Admin	By clicking the eye icon on customer data, the admin can view the complete profile of each customer.	Displaying the profile of each customer.	Valid
Edit customer data by Admin	By clicking the pencil icon on customer data, the admin can update each customer data.	Updating desired customer data.	Valid
Input Installation Data by Admin	Displaying a form for adding installation data by filling in PAB Number, National ID (NIK), Village, and Sub-District.	The system would store installation data in the database if the data entered in the Add Installation Data form complies with the system's requirements.	valid
Edit installation data by Admin	By clicking the pencil icon on the installation data, the admin can update each installation data.	Updating desired installation data.	Valid
Village Data Menu	Displaying Village Data and a form for adding, editing, and deleting village data.	Successfully displaying Village Data and being able to add, edit, and delete village data.	Valid
Sub-District Data Menu	Displaying Sub-District Data and a form for adding, editing, and deleting sub-district data.	Successfully displaying Sub-District Data and being able to add, edit, and delete sub-district data.	Valid
Billing Data Menu	Displaying billing data and a form for adding bills for each customer according to the billing period.	Successfully displaying billing data and being able to add billing data for each customer according to the billing period.	Valid
Payment Data Menu	Displaying payment data and a form for updating payment status for each customer according to the billing period.	Successfully displaying customer payment data and updating payment status.	Valid
Complaint Data	Displaying complaints submitted by each customer.	Successfully displaying customer complaint data.	Valid

Table 3. Blackbox Testing for Customer User

Menu	Desired Outcome	Displayed Results	Status
Customer Registration Form	Displaying a form for filling in the National ID (NIK), Full Name, Date of Birth, Place of Birth, Address, Phone Number, Email, and Password for system login.	The system would store customer data into the database if the data entered the registration form adheres to the system's criteria.	Valid
Billing Menu	Displaying Customer Billing Data according to the billing period and generating invoice.	Successfully displaying Billing Data and Printing an Invoice.	Valid
Payment Menu	Displaying Payment Data and providing a form for uploading payment proof.	Successfully displaying Payment Data and uploading payment proof for bills.	Valid
Complaint Menu	Displaying Complaint Data and offering a form for submitting complaints.	Successfully displaying Complaint Data and submitting a complaint.	Valid

From the above results, the breakdown for each assessment can be determined Valid 16 and Not Valid 0. After conducting the testing for functionality, the results indicate that all predetermined functions are functioning properly. This can be concluded using the following formula:

$$\mathbf{x = 1 - \frac{a}{b}}$$

$$\mathbf{x = 1 - \frac{0}{16}}$$

$$\mathbf{x = 1}$$

According to the formula for measuring the implementation of functionality, functionality is considered good if the value of x is greater than 0.5 and approaches 1. Based on these results, the testing of the system's functionality aspect is deemed appropriate.

Usability Testing

Table 4. Usability Testing Table for Usefulness Factor

Factor	No	Question	Assessment Results					Score	Percentage Score
			SS	S	CS	KS	STS		
Usefulness	1	This Information System helps me become more effective in processing data.	6	4	0	0	0	46	92%
	2	This Information System assists me in being more productive in data processing.	4	6	0	0	0	44	88%
	3	This Information System is beneficial for me in processing data.	6	4	0	0	0	46	92%
	4	This Information System has a significant impact on my tasks in data management.	3	7	0	0	0	43	86%
	5	This Information System makes things I want to achieve easier to accomplish.	5	5	0	0	0	45	90%
	6	This Information System saves my time when I use it.	3	7	0	0	0	43	86%

7	This Information System meets my needs.	6	4	0	0	0	46	92%
8	This Information System meets my expectations.	4	6	0	0	0	44	88%
Total							357	
Average								89%

The questionnaire results for the ease-of-use factor can be seen in table 5.

Table 5. Usability Testing Table for Ease-of-Use Factor

Factor	No	Question	Assessment Results					Score	Percentage Score
			SS	S	CS	KS	STS		
Ease of Use	1	This Information System is easy to use.	6	4	0	0	0	46	92%
	2	This Information System is straightforward to use.	6	4	0	0	0	46	92%
	3	This Information System is easily understood.	5	5	0	0	0	45	90%
	4	The Information System has very straightforward usage steps.	4	6	0	0	0	44	88%
	5	This Information System can be customized according to needs.	3	7	0	0	0	43	86%
	6	Using this Information System does not require excessive effort.	4	5	1	0	0	43	86%
	7	I can use this Information System without written instructions.	1	8	1	0	0	40	80%
	8	I do not perceive any inconsistencies while using this Information System.	2	7	1	0	0	41	82%
	9	Both infrequent and frequent users of this Information System will enjoy using this application.	1	8	1	0	0	40	80%
	10	Errors occurring in this Information System are swiftly and easily rectified.	3	6	1	0	0	42	84%
	11	I consistently succeed in using this Information System every time I use it.	0	10	0	0	0	40	80%
Total								470	
Average									85%

The questionnaire results for the factor of ease in learning or ease of learning can be observed in Table 6.

Table 6. Usability Testing Table for Ease of Learning Factor

Factor	No	Question	Assessment Results					Score	Percentage Score
			SS	S	CS	KS	STS		
Ease of Learning	1	I quickly learned this Information System.	2	6	2	0	0	40	80%
	2	I easily remember how to use this Information System.	3	5	2	0	0	41	82%
	3	The usage of this Information System is easy to learn.	5	5	0	0	0	45	90%
	4	I rapidly became skilled in using this Information System.	1	9	0	0	0	41	82%
Total								167	
Average									84%

The questionnaire results for the comfort factor in usage or satisfaction can be observed in Table 7.

Table 7. Usability Testing Table for Satisfaction Factor

Factor	No	Question	Assessment Results					Score	Percentage Score
			SS	S	CS	KS	STS		
Satisfaction	1	I am satisfied with this Information System.	2	8	0	0	0	42	84%
	2	I am willing to recommend this Information System to my friends.	4	4	2	0	0	42	84%
	3	Using this Information System is very enjoyable.	3	7	0	0	0	43	86%
	4	This Information System operates in accordance with what I desire.	2	8	0	0	0	42	84%
	5	I feel that this Information System is what I need.	2	8	0	0	0	42	84%
	6	I am pleased to use this Information System.	1	9	0	0	0	41	82%
Total								252	
Average									84%

In tables 4, 5, 6, and 7, the results of the conducted usability testing in this research are presented. The column of score percentages is obtained using the following formula:

$$\textbf{Index} = \frac{\textbf{Total score amount}}{\textbf{maximum score} \times \textbf{number of respondents}} \textbf{x100}$$

$$\mathbf{X} = \frac{((\mathbf{SS} \times \mathbf{5}) + (\mathbf{S} \times \mathbf{4}) + (\mathbf{N} \times \mathbf{3}) + (\mathbf{TS} \times \mathbf{2}) + (\mathbf{STS} \times \mathbf{1}))}{\textbf{maximum score} \times \textbf{number of respondents}} \times \mathbf{100\%}$$

Elaboration of score calculation based on each usability factor from the USE Questionnaire and the final usability score for this research are as follows:

Table 8. Usability Testing Scores

No	Factor	Total Number of Questions	Score Results (%)	Feasibility
1	Usefulness	8	89%	Highly Suitable
2	Ease of use	11	85%	Highly Suitable
3	Ease of learning	4	84%	Highly Suitable
4	Satisfication	6	84%	Highly Suitable
Overall Total		**29**	**86%**	Highly Suitable

Based on the table above, scores were obtained for usefulness (89), ease of use (85), ease of learning (84), and satisfaction (84). Each factor, when categorized according to the application's suitability, falls under the classification of "Highly Suitable". The amalgamation of all usability factors and the ultimate usability score for this application, based on responses from 10 participants and a total of 29 questions, yielded a score of 86, signifying classification as "Highly Suitable".

Conclusion

The web-based Customer Service Information System at UPTD PAB Taluk Kuantan was developed using PHP and MySQL and uses the Waterfall development method, namely: requirements (needs analysis), system design (system design), coding (coding), testing / verifications (testing), program implementation, Maintenance (maintenance).

The web-based Customer Service Information System at UPTD PAB Taluk Kuantan offers information and services to customers, including registration, reporting disturbances, and payment of water bills. Based on the Blackbox testing results, specifically evaluating functionality aspects, it is confirmed that the system is feasible. Additionally, the results of usability testing for the web-based Customer Service Information System at UPTD PAB Taluk Kuantan, conducted with 10 respondents and consisting of 29 questions, fall within the "Very Feasible" category, achieving a test result percentage of 86%.

Based on the researchers' direct experience throughout the research process, the limitations encountered include the research's exclusive focus on the website as the object of research, while there are numerous other information systems available, such as Android, applications, and IOS. The web-based Customer Service Information System at UPTD PAB Taluk Kuantan still exhibits several deficiencies; therefore, it requires further development for improvement. Consequently, the following suggestions are provided:

a. For UPTD PAB Taluk Kuantan, it is anticipated that the implementation of this Customer Service Information System will enable the provision of high-quality information and services to customers.
b. Researchers are encouraged to further enhance this information system to incorporate a wider range of comprehensive features, thereby enhancing customer service even further.

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