E-ISSN: xxxx-xxxx
DOI:…

DIGITIZATION OF PUBLIC FACILITY SERVICE REPORTS BY THE PUPR DEPARTMENT CIANJUR REGENCY

Achmad Rifai *1, Widianjani[2], Maulana Syarief Hidayat[3]

[1,2,3] Informatics Engineering Study Program, Faculty of Engineering, Universitas Putra Indonesia, Indonesia

Email: [1]wennrifai@gmail.com, [2]widianjani06@gmail.com

Article Info

Article history:
Received May, 1, 2024
Revised June, 5, 2024
Accepted July, 13, 2024

Keywords:
Community,
PUPR,
Waterfall,
Data,
User.

ABSTRACT

Public facilities are the most visible and beneficial to the community. Therefore, this research develops an information system to process damage reports submitted by the community, specifically in Cianjur Regency. The Cianjur Regency Public Works and Spatial Planning Department (Pekerjaan umum dan Perumahan rakyat, PUPR) is the object of this research, focusing on road construction. The research method is qualitative, and the system development uses the waterfall method. Data collection was conducted through observation and interviews with the PUPR office to obtain sample data. The research results indicate that, based on the output and workflow of the system, it aligns with the specified design. The system successfully processes data accurately, determines the data to be displayed, responds to user requests, and ensures that all features, tools, and menus function properly

Corresponding Author:
Achmad Rifai
Informatics Engineering Study Program, Faculty of Engineering,
Universitas Putra Indonesia, Indonesia
Email: wennrifai@gmail.com

1. INTRODUCTION

Public facilities are amenities that must receive extra attention from their managers. Good management also reflects well on the managers [1]. Public services are essential for every city, including those related to government, security, and the economy, and aim to serve the needs of both residents and tourists visiting the city [2].

The rapid development of Cianjur City as the regency capital demands that the government or service providers be quick to meet the needs of the community in their daily activities. However, problems often arise due to a lack of public awareness in maintaining and caring for the provided facilities [3]. If these facilities do not function properly, it is the community that suffers the consequences, disrupting their daily activities [4]. Reporting damage to public facilities to the relevant department often takes a long time for the reporters.

Based on these issues, the researcher is interested in conducting a study and developing an Android-based information system application for reporting public facility services to the PUPR Department of Cianjur Regency, specifically for reporting within Cianjur City. The hope is that this system will foster good cooperation between the community and the department, making it easier for the public to quickly and responsively report any damage to public facilities without having to spend time and visit the department directly.

2. METHOD

Therefore, based on the background issues and to achieve the objectives, the researcher adopts a qualitative research method. The PUPR Department of Cianjur Regency is selected as the research object. In the event of damage to public service facilities, such as road damage, the PUPR Department responsible for road construction takes action. This approach aims to foster positive interaction between the community and the PUPR Department of Cianjur Regency in city development and the maintenance of public service facilities for collective benefits.

2.1 Data collection methods

The first step in this research is to collect the necessary data to facilitate the research process [4][5][6].

1. Interviews: aimed at gathering information from reporters and details of damage reports that need to be recorded in the developed system [7][8].

2. Observation: to gather information on the government's efforts in responding to reported damage to public facilities in road construction, and to observe the reporting process and stages [9][11].
3. Literature review: gathering references from journals, websites, books, and proceedings [12].

2.2 System design method

The researcher has chosen to use the waterfall method for system design, which illustrates a systematic approach to software development. It begins with user requirement specifications and progresses through stages of planning, modeling, construction, and system delivery to customers/users (deployment), culminating in support for the complete software produced [13][14]. The waterfall system design cycle can be seen in the following diagram [15].

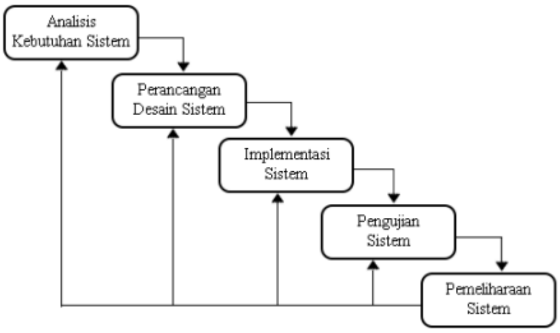


Figure 1. Waterfall Method [15]

The explanation of the process flow in the above diagram is as follows:

1. Analysis: The researcher analyzes all system requirements, including the usability and functions of the system itself.
2. Design: This stage illustrates the workflow of the system, the process of input and output of data in the system built using Unified Modeling Language (UML).
3. Implementation: The implementation process involves coding based on the designed system, using Java programming language in Android Studio and PHP.
4. Testing: To determine whether the system conforms to the designed process flow, Black Box Testing method is used.
5. Maintenance: Preventing errors in the system, if any, from the previous stages.

3. RESULTS AND DISCUSSION

This section discusses the research results, where the researcher's steps align with the waterfall method used as a reference.

3.1 System Analysis and Design

The first step in the waterfall method is analysis, to understand the needs and inputs for application development that come from all potential users.

A. Problem Analysis:

In the process of reporting damage to public service facilities, the community often finds it inconvenient to report incidents directly to the department, as it consumes a significant amount of time. The design of this public service facility damage reporting information system aims to facilitate the community in reporting incidents without the need to visit the department, thus saving time. It is expected that this information system will foster interaction and collaboration between the community and the PUPR Department, enabling the department to fulfill its mandated tasks and functions effectively.

B. System Analysis:

The information system for reporting public service facility services of the PUPR Department in Cianjur Regency will include the process of reporting damage to public service facilities in the field of road construction. When the system is first launched, users are required to create an account, which is used to access the system. Once the account creation process is complete, users can proceed to log in to the system. After successful login, the system displays the reported data received by the administrator. Users can also add reports if they observe damage to public service facilities in road construction. Reports added by users await approval from the administrator before being displayed in the report menu tab.

1. Expected System
   The system under development is expected to help resolve existing issues:
   a. Facilitate quicker and more effective response to public facility damage reports.
   b. Simplify the process for the community to report complaints and issues without needing to visit the department in person.
2. Functional Requirements
   The application involves two active actors: 1. User (Login, create and view reports, edit account), 2. Admin (Login, select, receive and process reports, manage and delete account data).
3. Non-functional Requirements

There are two essential requirements: Software (Notepad++, Photoshop CS6, Chrome, XAMPP, Android Studio, and Firebase) Hardware (CPU Core i3, 6GB RAM, Windows 8 OS, 320GB hard disk)

3.2 System Design

Based on the functional requirements analysis above, the system is designed using UML. The purpose is to illustrate the data flow and processes within the system.

A. Use Case Diagram

From the previously described functional requirements analysis, the modeling process is conducted using a use case diagram, which is created from the perspective of each user. In Figure 2, it illustrates that both users and admins can only access system features after successfully logging in. Once logged in, users and admins proceed to process data as described in Figure 3.

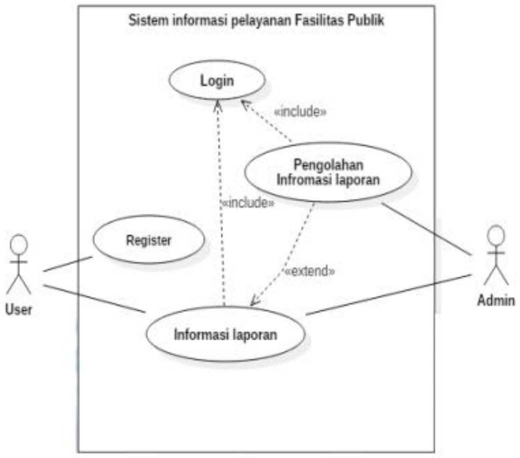

Sistem informasi pelayanan Fasilitas Publik
Login
«include»
Pengolahan Infromasi laporan
«include»
Register
«extend»
User
Admin
Informasi laporan

Figure 2. First-level user use case

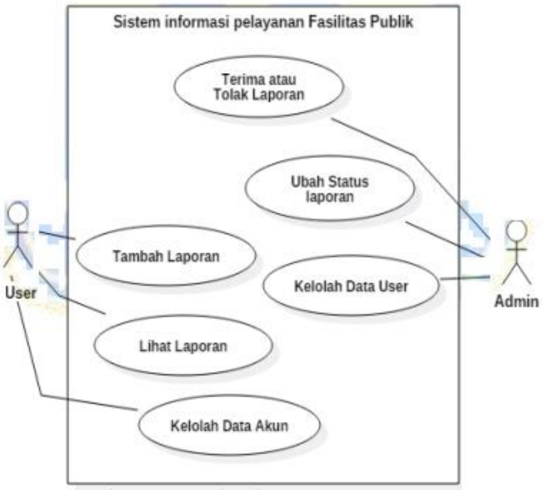


Figure 3. Second-level user use case

Here is a complete explanation of the use case diagram from Figure 3:

a. Admin
   - Receive or Reject Reports
   - Update Report Status
   - Manage User Data

b. User
   - Add Report
   - View Reports
   - Manage Account Data

B. Activity Diagram

The activity diagram models or illustrates the processes occurring within the system. Since admins and users have different functions and tasks, the creation of the activity diagram is divided into two parts as follows:

1. Admin Activity Diagram: Login, receive or reject reports, update report status, manage user data. Here is an example of one.

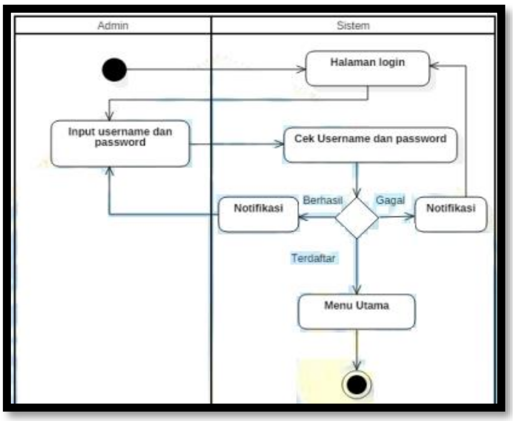


Figure 4. Admin login activity diagram

In Figure 4, the admin login activity diagram explains the login process. To log in, the admin is prompted to enter a username and password. The system then checks the entered username and password against the database to see if they are registered. If the entered username and password match the data in the database, the system displays the main menu page.

2. User Activity Diagram: Login, add report, manage account data. Here is an example of a user activity diagram for managing account data.

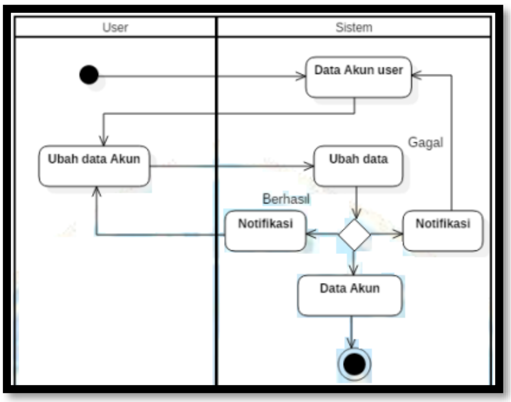


Figure 5. User account data management activity diagram

Figure 5 explains the process of a user managing their account data, which is used to access the system. During the registration or account creation process, the user's photo data is set to a default system user icon. In this process, users can modify account-related data, such as changing the password and updating the user's full name.

C. System Architecture

The diagram below represents the designed system architecture. The architecture illustrates the devices connected to the system, the database used by the system, and how it can be accessed via smartphones for users, and laptops and personal computers for admins.

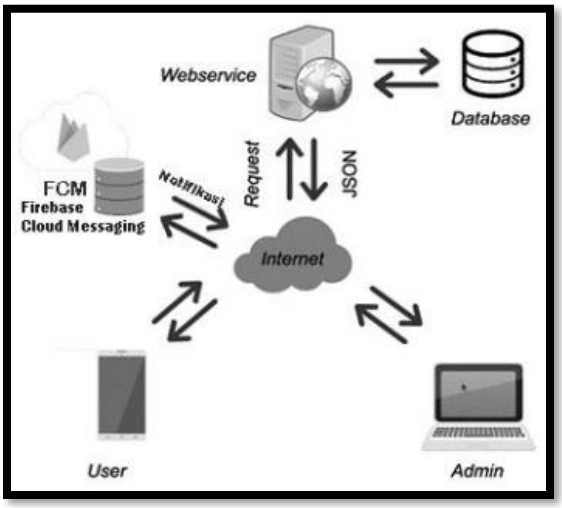


Figure 6. System Architecture

Figure 6 depicts the system architecture, which heavily relies on an internet connection to connect and receive data, whether fetching or sending data to the database. JSON is used for data exchange between different programming languages, while FCM (Firebase Cloud Messaging) sends notifications to users.

D. Database Design

The system being developed requires a database to store data, reports, and admin user accounts used to access the system. The database structure in the system design includes:

1. Database tables: tb_user, tb_admin, tb_laporan, tb_proses. Below is an example of the tb_admin table used in the application.

Table 1. tb_admin

Nama klm	Type	Constraint	Keterangan
Id	Int(11)	Primary key	Id_user
username	Varchar (100)		UserN akun
Password	Varchar(255)		Passw akun
Last_logged_in	datetime		Waktu login
Display_name	Varchar (100)		Nama
Email	Varchar (150)		Email
Photo	Varchar (100)		Photo

The tb_admin table is used to store the accounts of administrators who process and filter the reports submitted by users in the system. This table is used to determine the login process for administrators into the system.

2. Table Relationships
Based on the database tables mentioned above, the following are the relationships between the tables in the application.

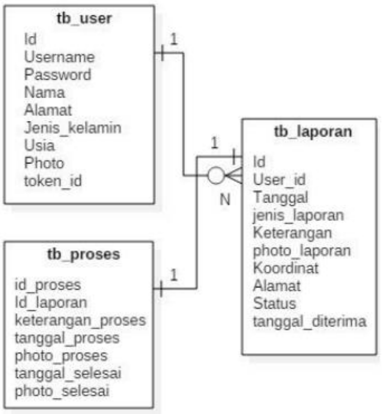


Figure 7. Database table relationships

Figure 7 explains the database table relationships used in the system as follows:

1. Table tb_user has a one-to-many relationship with table tb_laporan. This relationship means each user can report multiple reports, and one report can only be reported by one user.
2. Table tb_proses has a one-to-one relationship with table tb_laporan. This relationship means each reported data is stored and processed only once, and each processing instance handles one report.

E. Interface Design

After completing the system design process, the next step for the researcher is designing the interface of the built system. This step is crucial as it determines the comfort and ease of use for users operating the system. Given that the system built is client-server based, it means there are two types of users: the admin who acts as the server managing data, and the user who acts as the client inputting report data. Therefore, the interface design at this stage is divided into two parts: interface design for the admin user and interface design for the regular user.

1. Admin Interface consists of: Login page, admin home page, new report page, accept report page, accepted report data page, process report page, processed report data page, complete process page, completed processed report data page, completed report detail page, user data page, and user detail page. Below is the user detail page as part of the admin interface.

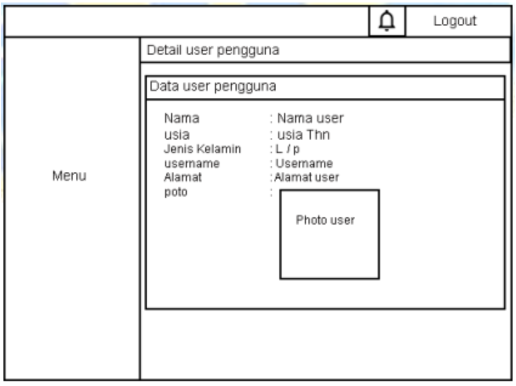


Figure 8. Design of User Detail Page Interface

2. User Interface consists of: splash screen layout, login, register, all reports, my reports, add report, report details, settings, change password, update profile. Below is an example of the update profile interface.

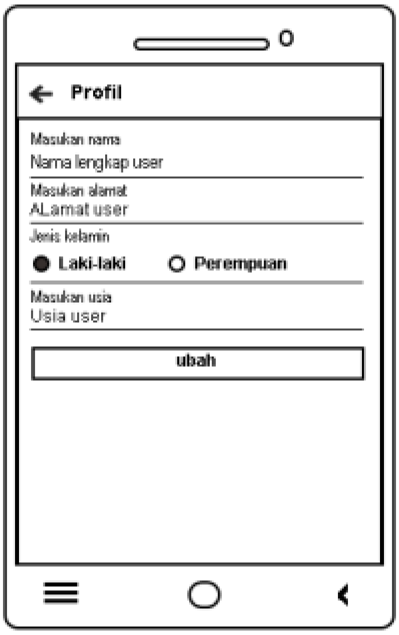


Figure 9. Design of Update Profile Layout Interface

If the user selects the "Edit Profile" menu from the settings layout, they will be taken to the "Edit Profile" page. On this page, users can proceed to modify their personal information associated with the account used to log into the system. The layout of the "Edit Profile" page resembles the image shown below.

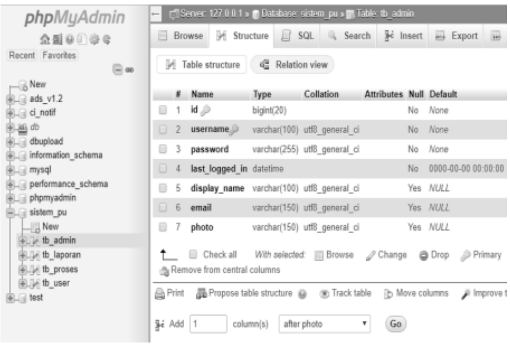
3.3 Implementation and Testing

Below is the implementation of the designed system mentioned above.

A. System Implementation

After the design process is completed, the researcher proceeds with the implementation process to create the designed system, so that it can operate according to the functions specified in the design phase. This built system's implementation is based on client-server architecture, meaning it involves two different user roles. The admin acts as the server, implemented using PHP programming with the CodeIgniter framework, meaning the system is implemented on the server side, and in this stage, the researcher performs the implementation using their laptop. The user acts as the client, implemented using Java programming with Android Studio software. The client-side implementation requires users to have an Android-operating smartphone, and in the implementation phase for the client, the researcher uses their own smartphone. The database implementation utilizes MySQL with XAMPP software.

1. Database Implementation: Creating the database, consisting of tables admin, user, report, process. Below is the admin table as an example of the database implementation.



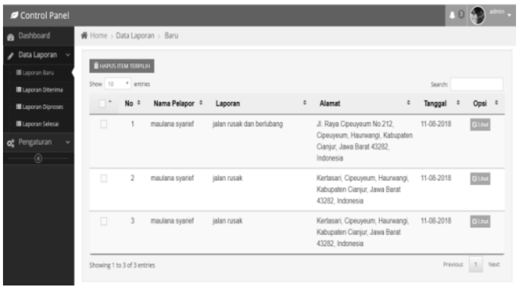
#	Name	Type	Collation	Attributes	Null	Default
1	id	bigint(20)			No	None
2	username	varchar(100)	utf8_general_ci		No	None
3	password	varchar(255)	utf8_general_ci		No	None
4	last_logged_in	datetime			No	0000-00-00 00:00:00
5	display_name	varchar(100)	utf8_general_ci		Yes	NULL
6	email	varchar(150)	utf8_general_ci		Yes	NULL
7	photo	varchar(150)	utf8_general_ci		Yes	NULL

Add 1 column(s) after photo

Figure 10. Creation of the admin table.

After creating the database, the next step involves creating the admin table used to store admin accounts, which are responsible for receiving and managing report data as well as processing user account data. The structure of the admin table is depicted in the following figure.

2. Implementation of the admin interface pages, including: admin login, admin home, new report, accept report, received reports data, process received reports data, processed reports data, process processed reports data, completed processed reports data, details of completed report data, user data, details of user data. Below is an example of the admin page for new report data.



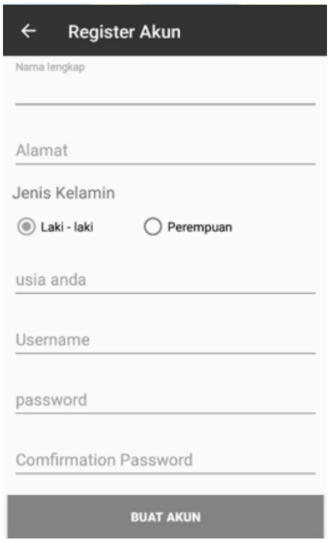
	No	Nama Pelapor	Laporan	Alamat	Tanggal	Opsi
□	1	maulana syarief	jalan rusak dan berlubang	Jl. Raya Cipeuyeum No 212, Cipeuyeum, Haurwangi, Kabupaten Cianjur, Jawa Barat 43282, Indonesia	11-08-2018	Lihat
□	2	maulana syarief	jalan rusak	Kertasari, Cipeuyeum, Haurwangi, Kabupaten Cianjur, Jawa Barat 43282, Indonesia	11-08-2018	Lihat
□	3	maulana syarief	jalan rusak	Kertasari, Cipeuyeum, Haurwangi, Kabupaten Cianjur, Jawa Barat 43282, Indonesia	11-08-2018	Lihat

Showing 1 to 3 of 3 entries

Figure 11. Implementation of new report data.

Figure 11 depicts the new report data page, which displays newly added reports by users with a filter for pending status reports.

3. Implementation of the user interface includes: Application Splashscreen, Login Screen, Account Registration Screen, All Reports Home Screen, My Reports Home Screen, Add Report Screen, Report Detail Screen, Account Settings Screen, Change Password Screen, Update Profile Screen. Below is an example of the implementation interface for the account registration screen.



Nama lengkap

Alamat

Jenis Kelamin

● Laki - laki ○ Perempuan

usia anda

Username

password

Comfirmation Password

Figure 12. Account Registration Implementation

Every user utilizing the system must first log in with an account registered in the system. If a user does not have an account, they can proceed with the account registration process on the following page to create a new account.

3.4 System Testing

After the system implementation process is completed, the author proceeds to the system testing phase to determine whether the workflow or processes within the system align with the expected design. System testing is conducted using the Black Box Testing method, which aims to observe the execution results through test data and verify the functionality of the software, ensuring it conforms to the expected outcomes or processes. The testing factors utilized include access control and ease of use.

Table 2. System testing

Test class	Testing	Test factor
Login	Username & password	Acess control
User	Displaying my report data based on the logged-in user's ID.	Ease of use
Admin	Processing the reports added by the user.	Ease of use

a. Testing Plan

The table below outlines the testing plan conducted by the researcher during the system testing phase as follows:

Table 3. System plan testing

Test Item	Description	Test file
Login user	Login to the app	Login.php
Create a User Account.	Creating a new user account for the user.	Register.php
Login admin	Login dalam aplikasi	Login.php
Checking new report data.	Checking new reports submitted by users and accepting/rejecting report data, then providing notifications to the user who submitted the report.	Laporan_baru.php
Checking received report data.	Checking accepted report data.	Laporan_diterima.php
Processing new report data.	Updating the report status, adding process images, and then notifying the user who reported it.	Laporan_diproses.php
Processing reports that have been processed.	Updating the status of processed reports, adding final process images, and then notifying the user who reported it.	Laporan_selesai.php
Checking user data.	Check user data, delete, and view user details.	User_pengguna,php
View all report data.	View reports that have been accepted by the admin in the "All Reports" menu.	Semua_lap.php
View report data.	View successfully accepted reports by the admin in the "Reports" menu.	Lap_saya.php
Check report details.	View details of the selected report in the list of report data.	Detai_lap.php
Add a new report.	Add new report data entered by the user.	Add_lap.php
Change profile photo.	Change profile photo of the user account.	Edit_photo_user.php
Change account password.	Change the password of the user's account.	Ubah_pass.php
Update account information.	Update data from the user's account.	Detail_user.php

b. Testing Cases and Results

The following are the results of the testing conducted by the researcher during the system testing process, aimed at verifying whether the system workflow conforms to the predetermined design. For a clearer understanding, the test cases and results are presented in the table below.

Tabel 4. Tabel kasus & hasil pengujian login

Test case	Description	Result	Success
Entering Username admin Password Admin.	If the data is entered correctly, display a success message and navigate to the admin home page. If entered incorrectly, display an error message and remain on the login page.	It can display both incorrect and correct messages, and successfully access the admin home page.	success
Entering Username user Password User.	If the data is entered correctly, it will enter the user home page. If entered incorrectly, it will display an error message and remain on the login page.	It can display both incorrect and correct messages, and successfully access the user home page.	success
Creating anew account for user login.	If the username is already taken by another user, the system will display a message indicating it's already in use. If the input is incorrect or left empty, the system will show an error message.	It can check for username uniqueness and display an error message if the input data is incorrect.	success

Tabel 5. Kasus & hasil uji Kelola data laporan

Test case	Description	Result	Success
Check new report data.	Display new report data from the user, sending notifications to the user's smartphone if the report is accepted or rejected. If there are no report data, provide a message saying "No report data available."	It can display new report data, send notifications to the user's smartphone, and show a message "No data available" if there are no reports yet.	success
Check received report data.	Display received report data, send notifications to the user's smartphone, and show a message if no reports have been accepted yet.	It can display received report data, send notifications to the user's smartphone, and show a message if there is no received data yet.	success
Check data of reports being processed.	Display data of reports being processed, send notifications to the user's smartphone, and show a message if there are no reports being processed yet.	It can display data of reports in process, send notifications to the user's smartphone, and show a message if there are no reports yet.	success
Check data of reports that have been completed processed.	Display data of reports that have been completed processed, send notifications to the user's smartphone, and show a message if there are no completed processed reports yet.	It can display processed report data, send notifications to the user's smartphone, and show a message if there are no processed reports yet.	success

Table 6. User Data Management Test Cases & Results

Test case	Description	Result	Success
Check user data	Display all user data using the system, view & delete user data.	It can display all data of user users, delete data, and check user details.	success

Table 7. User Function Test Cases & Results

Test case	Description	Result	Success
Check all reports.	Display received reports, provide a message if there are no report data, and handle no internet connection.	It can display report data and show messages for no data available and no internet connection.	success
Check my reports.	Display additional user reports based on the logged-in user, provide a message if there are no report data, and handle no internet connection.	It can display report data and show messages for no data available and no internet connection.	success
Check the details of the selected report.	Display details of the selected report data.	It can display details of the selected report data.	success
Add report data.	Add report data and send it to the server, display a success or failure message.	It can add data and display success or failure messages.	success
Change profile photo.	Change profile photo of the logged-in user.	It can change profile photo.	success
Change password.	Change password of the logged-in user.	It can change password.	success
Update user information.	Update personal information of the logged-in user.	It can update personal information.	success

c. Conclusion of Testing Results

Based on the system testing process outlined by the author earlier, the researcher concludes that the public facility service report information system of the Public Works Department (Dinas PUPR) of Cianjur Regency is free from program errors or syntax errors. During the system testing phase, the author used a smartphone with API level 25, and the system operated as expected

4. DISCUSSION

Several studies have discussed or developed report information systems for the public, such as the study titled: "Analysis and Design of a Public Facility Reporting Information System and E-KTP Creation Information for the Community," by Setiawan et al. (2020), but it only discusses the analysis and design of a possible application [16].

5. CONCLUSION

Based on the implementation or results of the research on the public facility service reporting process at the Public Works Department (Dinas PUPR) of Cianjur Regency, particularly in the field of road construction, it is still conducted manually by reporting damages to local government officials or by visiting the Dinas PUPR directly. To address these issues, the researcher decided to conduct a study using qualitative methods for data collection, including interviews and observations at the Dinas PUPR of Cianjur Regency. For the system design process, the author used the Waterfall method, a Use Case Diagram to illustrate the system's functions, and an activity diagram to depict the processes within the system. The final result of the research is an information system for reporting public facility services at the Dinas PUPR of Cianjur Regency. The system functions as a medium for the residents of Cianjur Regency to report damages to public facilities, particularly in the field of road construction. This system simplifies the process of reporting road damages, so the public or reporters no longer need to visit the Dinas PUPR of Cianjur Regency in person.

REFERENCES

[1] DKS Utomo, MH Gusadi, UZ. Rahmi, G. Ramadhan, Wiwik Dwi Pratiwi. "Identifying 4a’s Component (Attraction, Accessibility Amenity, And Ancillary) In Sade Tourism Village". Jurnal DIALEKTIKA: Jurnal Ilmu Sosial, Vol 22 No. 1 2024. P-ISSN: 1412 –9736 E-ISSN: 2828-545X. Jurnaldialektika.com

[2] Chang, S.; Smith, M.K. Residents’ Quality of Life in Smart Cities: A Systematic Literature Review. Land 2023, 12, 876. Https://doi.org/10.3390/land12040876.

[3] Kym Fraser. "Facilities management:the strategic selectionof a maintenance system". Journal of Facilities managementvol. 12 No. 1, 2014pp. 18-37q Emerald Group Publishing Limited 1472-5967 DOI 10.1108/JFM-02-2013-0010.

[4] Chu EW, Karr JR. "Environmental Impact: Concept, Consequences, Measurement". Reference Module in Life Sciences. 2017:B978-0-12-809633-8.02380-3. Doi: 10.1016/B978-0-12-809633-8.02380-3. Epub 2016 Oct 31. PMCID: PMC7157458.

[5] C. Gratton and I. Jones. "Research methods for sports studies second edition". British Library. ISBN13: 978–0–415–49392–5 (hbk) ISBN13: 978–0–415–49393–2 (pbk) ISBN13: 978–0–203–87938–2 (ebk)

[6] N. Mack, C.W Kathleen M. Macqueen, Greg Guest, Emily Namey. Qualitative Research Methods: A Data Collector’s Field Guide. by Family Health International, ISBN: 0-939704-98-6. Family Health International P.O. Box 13950 Research Triangle Park, North Carolina 27709 USA http://www.fhi.org E-mail: publications@fhi.org

[7] Hamza Alshenqeeti. "Interviewing as a Data Collection Method: A Critical Review". English Linguistics Research. Vol. 3, No. 1; 2014. pp 39-45. ISSN 1927-6028 E-ISSN 1927-6036. https://www.sciedu.ca/journal/index.php/elr/article/view/4081/2608

[8] Kathleen W. Brown Paul C. Cozby Daniel W. Kee. Patricia E. Worden. "Research Methods in Human Development", Second edition. Mayfield Publishing Company. ISBN 1-55934-875-5

[9] Synthesis Report. "Best Practices for Road Condition Reporting Systems". September 2014. Publication No. FHWA-HOP-14-023.

[10] FEMA. “Developing and Maintaining Emergency Operations Plans”. Comprehensive Preparedness Guide (CPG) 101. Version 2.0.

[11] Department of transportation. “Standard Specifications”. Caltrans. sacramento, california 95815-3800 Telephone (916) 263-0822 Fax (916) 263-0470 Publication Unit Website:http://caltrans-opac.ca.gov/publicat.htm

[12] T. L. Sajeevanie. “Literature Review and Academic Research”. IJCRT. Volume 9, Issue 1 January 2021, ISSN: 2320-2882. www.ijcrt.org

[13] M. Kamel, I. Bediwi and M. Al-Rashoud. “Planned Methodologies vs. Agile Methodologies under the Pressure of Dynamic Market”. JKAU: Eng. Sci., Vol. 21 No.1 pp: 19-35 (1431A.H./2010 A.D.) DOI: 10.4197 / Eng. 21-1.2

[14] Marian STOICA, Marinela MIRCEA, Bogdan GHILIC-MICU. ” Software Development: Agile vs. Traditional”. Informatica Economică vol. 17, no. 4/2013. DOI: 10.12948/issn14531305/17.4.2013.06.

[15] Marisa Leavitt Cohn, Susan Elliott Sim & Charlotte P. Lee. “What Counts as Software Process? Negotiatingthe Boundary of Software Work Through Artifactsand Conversation”. Computer Supported Cooperative Work (2009) 18:401–443. Springer 2009. DOI 10.1007/s10606-009-9100-4.

[16] M.P.H. Setiawan & Fajar Masya. ” Analisa Perancangan Sistem Informasi Pelaporan Fasilitas Umum Dan Informasi Pembuatan E-KTP Untuk Masyarakat”. RABIT, Volume 5 No. 1 Januari 2020. pp 1-8