Design of a Web-Based Hazard E-Report Application Using the Laravel Framework at Surabaya Aviation Polytechnic

Lydia Cascadia[1], Yuyun Suprapto[2], Laila Rochmawati[3]

[1,2,3)] *Civil Aviation Polytechnic of Surabaya*
[*]*Corresponding author. Email: lydiacascadiaa@gmail.com*

ABSTRACT
Surabaya Aviation Polytechnic is a vocational higher education institution equipped with various facilities such as classrooms, laboratories, and dormitories to support the academic and non-academic activities of cadets. However, the current manual reporting system for facility damage poses several problems, including delays in handling, lack of centralized documentation, and limited transparency in report status. To address these issues, this study aims to design and develop a web-based e-report hazard application using the Laravel framework. The study adopts the ADDIE (Analyze, Design, Development, Implementation, Evaluation) development model as a systematic approach. The system design uses the Unified Modeling Language (UML), while the application evaluation is conducted using the User Experience Questionnaire (UEQ). The application is developed using the PHP programming language and tested based on user feedback. The result is a web application that allows cadets to submit hazard reports accompanied by photo/video evidence, with automatic notifications sent to hazard officers (PJ Hazard) and dormitory supervisors. Additionally, the system enables users to track the status of repairs and facilitates audits by relevant authorities. Based on the evaluation results, the application has proven to be effective and efficient in improving the speed and transparency of the reporting process. Therefore, this application is expected to be implemented.

Keywords: *e-report hazard, ADDIE, Laravel, facility reporting, web application.*

1. INTRODUCTION

Globalization has undergone significant changes, especially in the field of technology. Today, technology supports human activities in the era of globalization, connecting businesses and individuals, as well as in the academic field. The era of globalization has been driven by technology that has transformed human activities [1]. Information and Communication Technology (ICT) plays a key role in the era of globalization, enabling instant access to information from anywhere via the internet. This accelerates and simplifies data exchange, even over long distances. However, some institutions or organizations have not yet optimally utilized technology in their business operations, resulting in obstacles in information dissemination and data reception failures [2].

Surabaya Aviation Polytechnic is one of the vocational colleges located in Surabaya that focuses on aviation education. Surabaya Aviation Polytechnic has facilities such as classrooms, laboratories, and dormitories to support the education provided to students for both non-academic and academic activities. Additionally, Surabaya Aviation Polytechnic extensively implements technology to support both academic and non-academic activities, including applications and websites [3].

The Surabaya Aviation Polytechnic dormitory is managed by the Hazard Manager (PJ) and the Head of the Dormitory Unit. Currently, based on a survey conducted among cadets, the manual system of reporting dormitory facility damage through the Hazard Manager has caused several critical problems [4]. First, limited accessibility because the Hazard Manager is not always available, causing delays in reporting. Second, low transparency, as cadets often do not know the status of their reports due to

the absence of a real-time tracking mechanism. Third, decentralized documentation leads to reports being lost or overlooked. Additionally, inefficient coordination between the Hazard Officer and the Dormitory Unit Head prolongs repair times, even for urgent issues such as electrical or water problems [5].

To address this issue, some cadets hope that the Surabaya Aviation Polytechnic will have a digital reporting application that allows cadets to report damage directly via smartphone without relying on PJ Hazard, with features for uploading photos/videos and detailed descriptions. The system would include automatic notifications to the Hazard Officer and Dormitory Unit Head for swift response. Therefore, this study developed an application to improve the detrimental conditions. The model used is ADDIE (Analyze, Design, Development, Implementation, and Evaluation), a popular and structured instructional design-based application development model [6]. The research process will follow the ADDIE model, starting with analysis of observation results with relevant parties, followed by design using the Unified Modeling Language (UML) model, which is used to visualize and design software systems. The development and implementation stages will use PHP with the Laravel framework, while evaluation will be conducted through a User Experience Questionnaire (UEQ) to collect user feedback on the application [7].

Based on the many technologies that have been implemented at the Surabaya Aviation Polytechnic, this study aims to design a web-based e-report hazard application using the Laravel framework with an application development model called ADDIE, and to design the application using UML, as well as to evaluate it based on UEQ [8]. The e-report system in this study is a system that can report facility issues through cadet gadgets, thereby helping to effectively and efficiently improve issues in the dormitories, laboratories, and cadet classrooms at Surabaya Aviation Polytechnic.

1. Research Objectives

Referring to the existing problems, this research aims to design a web-based e-report hazard application using the Laravel framework at the Surabaya Aviation Polytechnic to design a web-based e-report hazard application using the ADDIE development model and also using the Laravel framework for PHP coding. And to understand how the reporting application works, it is carried out by parties who are aware of facility issues, then improvements are made by the Hazard Project Manager, and notifications and reports are provided to the dormitory supervisor [9].

2. Research Benefits

This study is expected to increase awareness within the Surabaya Aviation Polytechnic by utilizing technological developments through the use of website-based applications to monitor issues that arise at the Surabaya Aviation Polytechnic facilities [10].

3. Theoretical Basis

Laravel is an open-source web application development framework based on PHP, designed to simplify the process of developing complex web applications with elegant and expressive syntax. This framework was first released in 2011 by Taylor Otwell and has since become one of the most popular PHP frameworks in the world. Laravel provides a variety of powerful built-in features, such as a flexible routing system, an ORM (Object-Relational Mapping) called Eloquent, authentication management, and a template system called Blade. Additionally, Laravel supports the MVC (Model-View-Controller) architecture, separating logic, presentation, and data, making it easier for developers to organize code and improve application maintainability [11]. With a large community and comprehensive documentation, Laravel is the top choice for modern PHP developers looking to build scalable, secure, and efficient web applications [12].

An E-Report (Electronic Report) is a digital report presented in electronic format, created, managed, and distributed through computer devices or web-based systems. E-Reports replace conventional (printed) reports by leveraging information technology to enhance efficiency, speed, and ease of access [13].

E-Reports can encompass various types of documents, such as financial reports, survey results, performance reports, or statistical data, which are stored and shared online. Features such as data processing automation, interactive visualization, and integration with database systems make e-reports more dynamic and easier to update compared to manual reports. E-Reports provide users with ease in inputting and submitting report data that is directly integrated with the system. As a result, they can be effectively implemented through an e-report platform.

2. METHODS

The aim of this stage is to assess the effectiveness of the application and identify areas for improvement. Evaluation can be carried out during the development process (formative evaluation). After testing the application's functionality with each user, the researcher will administer a questionnaire in accordance with the User Experience Questionnaire (UEQ) method. The researcher will then evaluate the results based on predefined indicators. If the UEQ indicators show red, it means further improvements are needed. If the indicators are yellow, it indicates the application is functioning normally. If the indicators are green, it means the application is functioning as intended [14].

The design of tools or applications is a necessary stage in the creation of a web-based e-report hazard application using the Laravel framework. This design includes the design of the tool, how it works (flowchart), and the components used.

1. Design of the Tool

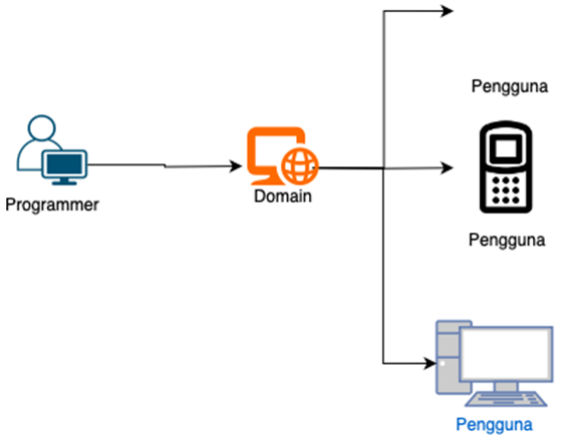

Figure1 Design of the Tool

2. How users work

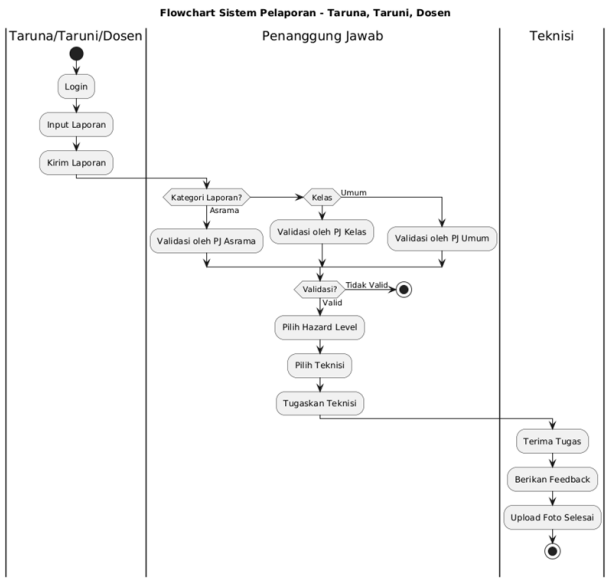

Figure1 Flowchart

Flowchart of how the web-based Laravel framework e-report hazard application design works from start to finish is as follows:

1) The user logs in and is then shown the dashboard
2) Cadets take photos and upload images of problematic facilities
3) The system then automatically assigns the unit so that it understands which unit is related to the problem
4) Once the unit's location is known, the responsible party or unit manually assigns the hazard category (high, medium, low) in the application system
5) From there, the relevant unit will contact the hazard responsible party or technician
6) The Hazard Responsible Party (HRP) receives a notification of the facility issue
7) The HRP provides an estimated repair timeline
8) The relevant unit receives the estimated repair timeline
9) The relevant unit will inspect the facility repair; if not yet repaired, the Hazard Responsible Party will perform the repair first
10) However, if already repaired, the relevant unit will receive proof of repair
11) Display a notification that the facility has been repaired to the cadets
12) The Director can print the report.

3. RESULTS AND DISCUSSION

The stages aimed at determining the problems or needs to be solved in the application, human resource analysis is used to determine the users who will be involved in the application, and user requirements analysis.

1. User analysis

Based on the business processes that will be implemented in the Surabaya Aviation Polytechnic facility reporting system, the researcher obtained information that this web-based e-report hazard application will have the following roles:

1) Cadets
2) Hazard managers (Technician)
3) Administrator (responsible for dormitories, classrooms, laboratories)
4) Super user (director).

2. Design

This stage aims to design an application based on the results of the analysis, where this stage is used to describe the flow of content or application, as well as to describe the application design. A use case is a diagram used to describe the interaction between user activities and the system to execute the business process of reporting facilities at Surabaya Aviation Polytechnic. Students can access the login, submit facility complaints, monitor facility repairs, and receive notifications about reports

and repairs. Administrators (responsible for dormitories, classrooms, and laboratories) can receive complaint reports, monitoring, and repair reports from the Hazard Project Manager (PJ Hazard), while the Hazard Project Manager or technicians can view facility complaints, repair estimates, and submit facility reports to administrators (responsible for dormitories, classrooms, and laboratories), as well as print reports, which can be done by super users.

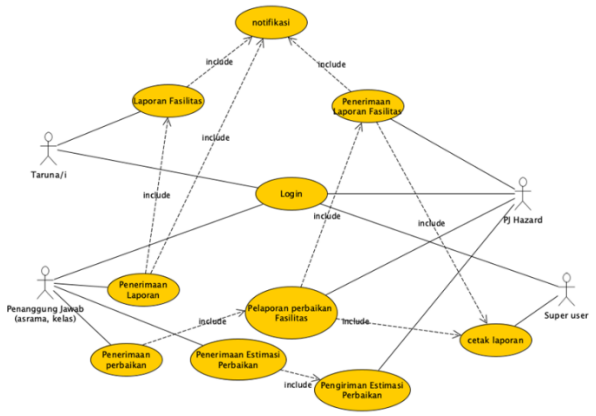

Figure1 Use Case

A class diagram is a database diagram used in the Surabaya Aviation Polytechnic's e-report hazard system.

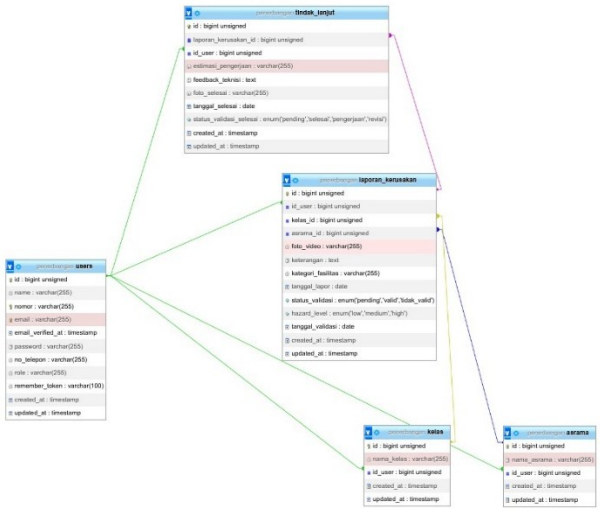

Figure2 *Class diagram*

Showing the relationship between tables in the database in the users table there are names, numbers, emails, passwords, phone numbers, and roles, which are related to the damage_report, not_continued, class, and dormitory tables, Meanwhile, the damage_report table contains ID, user_ID, class_ID, dormitory_ID, photo_video, description, facility_category, report_date, validation_status, hazard_level, and validation_date. The report table is related to the follow-up, class, and dormitory tables. the tindak_lanjut table contains id, laporan_kerusakan_id, id_user, work estimate, technician feedback, completed photo, completion date, and status, while the asrama and kelas tables both contain id, id_user, and class name or dormitory name. The next step after designing the system is to create a wireframe design to be implemented in the system that will be built.

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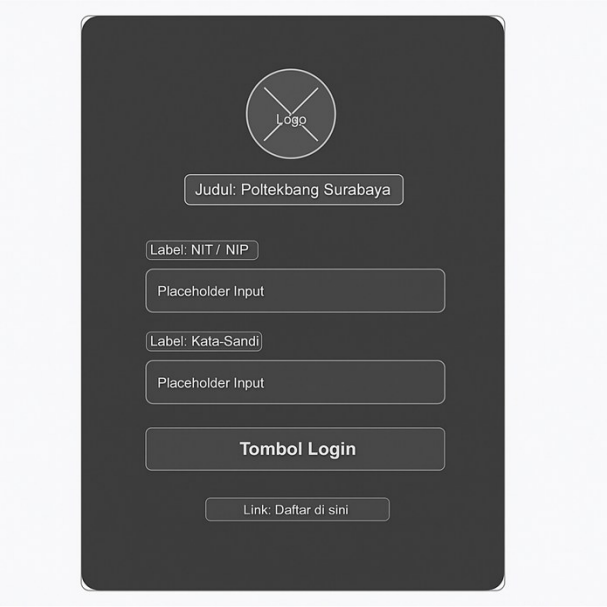

Figure3 *Wireframe Login*

Displaying the wireframe of the Poltekbang Surabaya application login page designed for user authentication. This display shows the title “Poltekbang Surabaya” at the top as the institution's identity, followed by a login form consisting of two main input fields. The first field is labeled “NIT/NIP” with a placeholder for entering an identity number, while the second field is labeled “Password” with a placeholder for entering a password. At the bottom of the form, there is a “Login” button to process authentication and a “Sign Up Here” link directing users to the registration page.

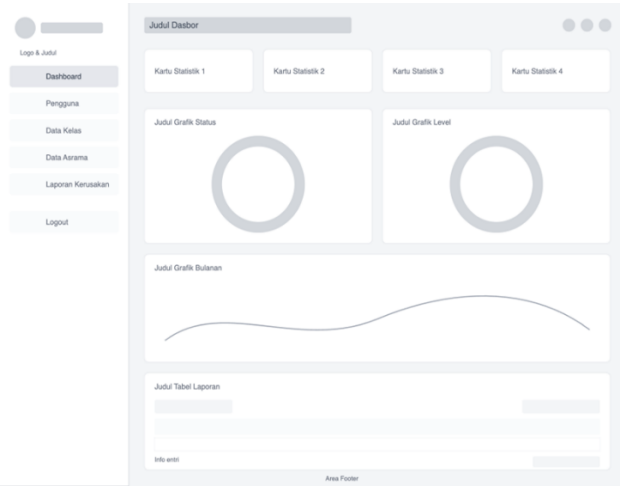

Figure4 *Wireframe Dashboard*

Displaying the wireframe dashboard of the Poltekbang Surabaya facility management application, which is divided into several main components. On the left side is a navigation sidebar containing menus such as “Dashboard,” “Registration,” “Class Data,” “Damage Reports,” and “Logout,” allowing users to navigate between features. The main dashboard area displays several statistical cards & data visualizations, including two status and monthly graphs on Statistical Card 1, and two graphs of different levels on Statistical Card 2.

This view also includes report tables and entry information to display data in detail. This wireframe design shows the basic structure of the admin interface, which focuses on comprehensive statistical information presentation and data management, with an organized layout to facilitate monitoring and decision making.

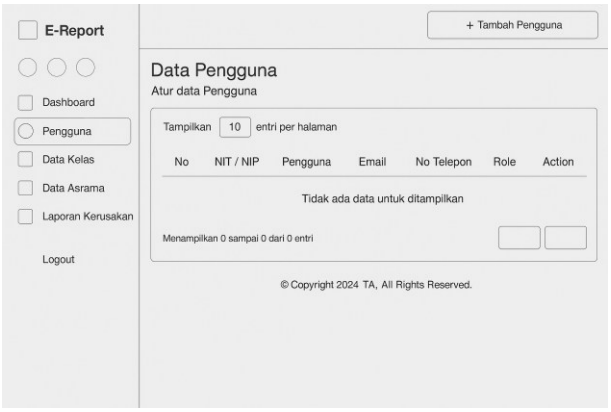

Figure5 User Data Wireframe

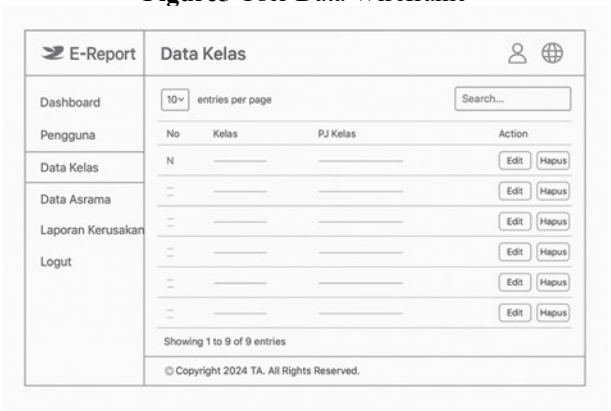

Figure6 Class Data Wireframe

Displaying the user interface design for the “E-Report” system with a focus on the “Class Data” page. This design features a simple layout consisting of several main elements. At the top, there is the “E-Report” logo on the left, the “Class Data” title in the center, and user and globe icons on the right, which likely indicate login options or language settings. Below that, there is a vertical navigation menu on the left side that includes options such as “Dashboard,” “Users,” “Class Data,” “Dormitory Data,” “Damage Reports,” and “Logout.” The middle section displays a table with columns for “No,” “Class,” “Class Project Manager,” and “Action,” used to display a list of classes with edit and delete options. Above the table, there is a dropdown menu to select the number of entries per page (default 10) and a search column.

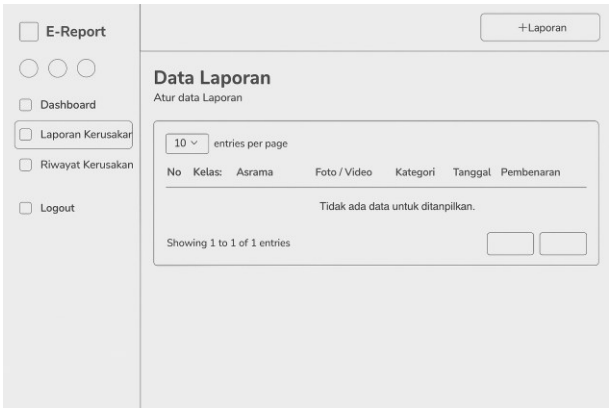

Figure7 Wireframe Data Report

The wireframe shown depicts the interface of the “Report Data” page in the “E-Report” system. This design features a layout consisting of a vertical navigation menu on the left side, which includes options such as “Dashboard,” “Damage Report,” “Damage History,” and “Logout,” with a circle icon at the top as a decorative element. The main section of the page displays the title “Report Data” and the subtitle “Manage Report Data,” followed by a dropdown menu to select the number of entries per page (default 10). The table below has columns for “No,” “Class: Dormitory,” “Photo/Video,” “Category,” “Date,” and “Justification,” but currently displays the message “No data to display.”

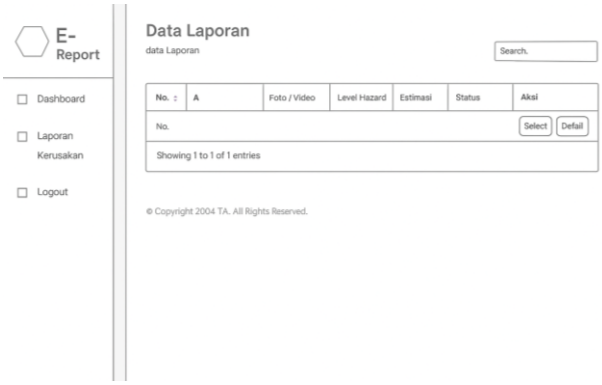

Figure8 Report Wireframe

In the image above describes the interface of the “Report Data” page in the “E-Report” system. This design features a vertical navigation menu on the left side with a hexagonal icon at the top representing the “E-Report” logo, followed by the options “Dashboard,” “Damage Report,” and “Logout” in a checkbox format.

The main section of the page displays the title “Report Data” and the subtitle “Report Data” at the top left, along with a search column at the top right. The table in the center has columns for “No.”, “A”, “Photo/Video”, “Hazard Level”, “Estimate”, “Status”, and “Action”, with only one row showing “No” and the ‘Select’ and “Default” button options in the action column.

Figure9 Report Wireframe

The wireframe shown in the image above illustrates the interface of the "Completed Report Details" window in a system. This design features a box with the title "Completed Report Details" at the top, accompanied by an "X" icon in the top-right corner to close the window. Inside the box, there are several labels showing report details, including "Dormitory," "Facility Category," "Description," "Hazard Level," "Estimated Work," "Validation Status," and "Technical Feedback," each with an empty space next to it to display information that has not yet been filled in. At the bottom, there is a note stating "No completed photos available," indicating that the photo element related to the report is not yet available.

3. Implementation

The results of the implementation of this application have been carried out based on thorough analysis, and the application has been tested by stakeholders or users of this application, such as testing the application with the Head of the Class Unit, as can be seen in the image below.

Figure1 Implementation of the Application with the Head of the Class Unit

This application will be used by cadets to report damage and view repair results, by technicians to receive damage reports and provide feedback on repair estimates, by supervisors (dormitories, classrooms, etc.) to report cadet reports to technicians and set hazard levels, and finally by directors to view damage reports and facility repairs.

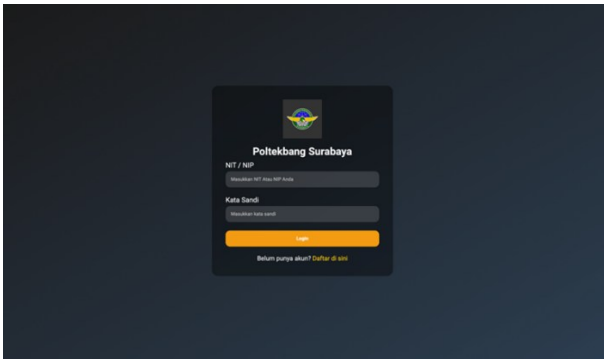

Figure2 *Login*

Displaying a login interface designed for use by all types of users to access the application. In this usage scenario, users are required to enter their NIT/NIP data and registered password to log in. The interface displays the institution's logo at the top, followed by input fields for NIT/NIP and password, and an orange "Login" button to initiate the authentication process. Additionally, there is an option labeled "Don't have an account? Sign up here" that allows new users to register.

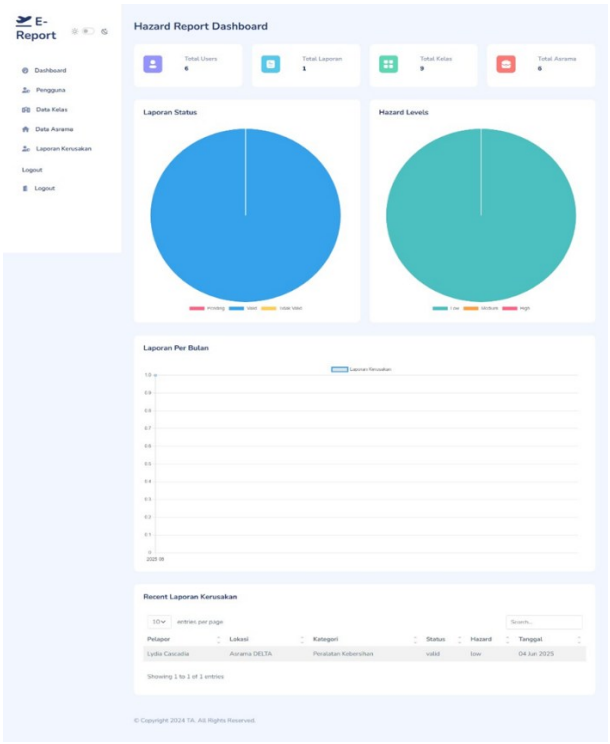

Figure3 Super Admin Dashboard

The image above shows the super admin dashboard, which is designed to provide a complete overview of

activity and report status. This dashboard includes information such as the total number of users (6 users),

total reports (11 reports), total classes (9 classes), and total dormitories (6 dormitories). In addition, there are two pie charts showing report status (Pending, Valid, Invalid) and hazard level. The bottom section of the dashboard provides monthly report data in the form of a line graph, as well as a "Recent Damage Reports" table listing details such as the reporter, location, category, status, risk level, and date. The left-hand menu allows navigation to various sections such as Users, Class Data, Dormitory Data, and Damage Reports.

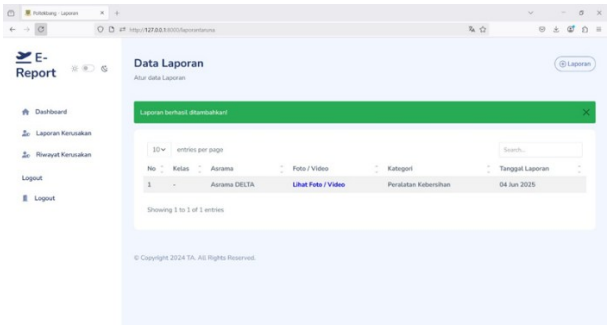

Figure4 Damage Report History

The image above shows the "Data Report" interface of the "E-Report" application in the "Damage Report History" section. This page displays a green notification stating "Report successfully added!". There is one report entry with class "-", DELTA dormitory, "View Photo/Video" option, "Cleaning Equipment" category, and report date June 4, 2025. The navigation menu on the left includes "Dashboard," "Damage Reports," "Damage History," and "Logout."

4. Quality of Service (QoS)

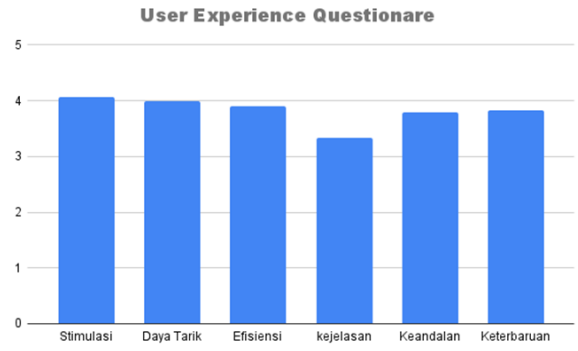

Figure1 QoS

The explanation of the UEQ assessment criteria is as follows: a score > 0 is classified as bad, > 1 as below average, > 2 as above average, > 3 as good, and a score above 4 as excellent. A survey was conducted on 30 respondents. The following is the calculation for the application evaluation based on its usage, where the user evaluation scores are summed up and divided by the maximum score. The results of the calculation can be seen in UeQ table.

Kategori	Total Skor	Skor Maksimal	Presentase
Stimulasi	122	150	122 / 150 = 81%
Daya Tarik	120	150	120 / 150 = 80%
Efisiensi	117	150	117 / 150 = 78%
Kejelasan	100	150	100 /150 = 66%
Keandalan	114	150	114 /150 = 76%
Keterbaruan	115	150	115 / 150 = 76%

UeQ table

Overall, these results show that the system has met the expectations of the majority of users in various aspects. However, there are still some elements, particularly clarity, that need to be improved in order to provide a more optimal and competitive user experience in the future.

4. CONCLUSION

Developing a web-based e-report hazard application design using the ADDIE (Analyze, Design, Development, Implementation, Evaluation) development model, leveraging the Laravel framework to ensure structured and efficient development [15].

The e-report hazard application is designed with a structured workflow involving various user roles. This system allows cadets to create facility damage reports by uploading visual evidence in the form of photos or videos. The reports are then processed by the Hazard Project Manager (Technician), who is responsible for analyzing the problem, providing an estimated completion time, and inputting the results of the repairs that have been carried out. The Responsible Party (Admin) for Dormitories/Classrooms/Laboratories plays a role in verifying the accuracy of reports, evaluating

repair progress, and setting damage priority levels based on urgency.

At the managerial level, the Director, as the Super User, has the ability to oversee the entire reporting process, verify data, and generate comprehensive reports for institutional monitoring and evaluation purposes. This integrated workflow ensures that the reporting and handling of facility damage occur effectively and transparently within the Surabaya Aviation Polytechnic environment.

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