



Designing an Information System and Database Using the Laravel Framework for Surabaya Aviation Polytechnic's D-III Air Navigation Engineering Study Program

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Article Info

Article history:

Submitted: February 28, 2025

Final Revised: March 15, 2025

Accepted: March 21, 2025

Published: March 27, 2025

Keywords:

Website

Laravel

ADDIE

Information System

ABSTRACT

In this era of globalization, access to information is growing rapidly through various media platforms on the internet. The Air Navigation Engineering Study Program of the Surabaya Aviation Polytechnic already has a website that is integrated with the official website of the Surabaya Aviation Polytechnic. However, the website is not yet optimal, with an unattractive appearance and incomplete information. To improve this, it is necessary to design an information system and database using the PHP Laravel and CSS frameworks to organize the layout and interaction style and other supporting software. This study uses the Research and Development (R&D) method with the ADDIE instructional design development model. The results of this study are a website-based information system that makes it easier for students, lecturers, and the general public to access information related to the Air Navigation Engineering Study Program of the Surabaya Aviation Polytechnic.

1. INTRODUCTION

In the rapidly developing digital era, websites have become a very crucial tool in various sectors, including education, business, and communication. Websites provide an effective platform for conveying information, promoting products or services, and interacting with users online. The Air Navigation Engineering Study Program (TNU) is one of the study programs at the Surabaya Aviation Polytechnic, which is tasked with organizing vocational education, research, and community service in the aviation field. Currently, the Surabaya Polytechnic is very concerned about the digitalization of the education system, and one form of digitalization of the education system is building an information system regarding the Web-based Air Navigation Engineering Study Program.

This information system facilitates the storage of document data online and facilitates access to study program information to the general public globally. Therefore, the author designed a website information system and database specifically for the Air Navigation Engineering D3 Study Program-based on a website. The website stores the work and documents of cadets and lecturers as well as study program activities. So that it can facilitate the search for previous documents for lecturers and cadets and facilitate the general public in finding complete and up-to-date information regarding the Air Navigation Engineering Study Program. Based on the background of the problem that the author has conveyed, the author tries to identify several existing problems, namely, how to design a website to facilitate access to the information system and database of the Air Navigation Engineering Study Program. How does the website work that can present information systems and databases?

The purpose of writing this Final Project design is to design and build a database information system in the Air Navigation Engineering study program and to find out the work process of a website that can present information systems and databases.

2. LITERATURE REVIEW

2.1. Information System

A system consists of a collection of interrelated elements to achieve certain goals. If there are elements in the system that do not achieve the same goal, then the element is not included in the system. Data that has been converted into a form that is useful for users and helps in decision-making is called information, Pradana, (2016). Thus, an information system is a collection of interrelated elements that are collected to process data, collect data, and produce accurate and effective information. In this case, information technology includes a portfolio of network providers, software, hardware, data, and storage technology.

The system in an organization is called an information system. This system combines the need to process daily transactions, assist operations, support management activities, and strategic activities of the organization, and provide reports to certain external parties, According to Vinet & Zhedanov (2014).

Information systems convert raw data into meaningful information, enhancing decision-making capabilities, (Hovhannisyan & Saakyan, 2024). Technology Integration, They encompass a portfolio of technologies, including network providers and software, which facilitate data management and analysis, (Adeyeye & Akanbi, 2024). Support for Operations, Information systems assist in daily transactions and management activities, ensuring efficient organizational functioning ("Informing Program Management Decisions Using Quantitative Set-Based Design", 2023).

Advanced systems utilize algorithms for data analysis, improving accuracy in decision-making under uncertainty, Hovhannisyan & Saakyan, (2024). Optimization Techniques, The application of optimization methods enhances system performance and problem-solving capabilities, crucial for effective management, Adeyeye & Akanbi, (2024). While information systems are vital for organizational success, their effectiveness can be hindered by challenges such as data quality and integration issues, which require ongoing attention and improvement strategies, Pandey, (2024).

2.2 Website

According to Sarosa (2017), the term "website" refers to a collection of digital data that is formatted and stored digitally, including content, documentation, and various readable information. In other words, part of a data collection that does not exist. Creating a website itself requires a "programming language" created by a programmer, a domain, which functions as a web address, and hosting, which functions as a data storage service provider for the website, which is then arranged in such a way that it is attractive and accessible to internet users. A website is a collection of information that is spread across the internet and can be accessed by everyone. However, not all websites provide information for free, because some ask their users to pay to access it.

2.3. Database

A database is a collection of data arranged in the form of a table consisting of rows and columns, and each entity has unique characteristics. Databases are usually used to store information related to organizations, applications, or systems.

2.4. Programming Languages

The languages used to create computer systems have evolved every year along with advances in computer technology. Modern programming languages are derived from machine languages whose syntax has been changed to make them easier for humans to understand. Computers can understand today's high-level programming languages by first changing the commands given by the programmer through a compiler or interpreter.

2.5. Laravel Framework

The framework structure is a basic concept structure used to solve or handle complex problems. In short, the framework is a container for a website to be built. By using this framework, the time needed to create a website becomes shorter, and the repair process becomes. By using this framework, the time required to create a website is shorter, and the improvement process is easier. Laravel is an open-source PHP-based framework that uses the concept of model view controller. Laravel is a framework that is widely used by programmers. Laravel is licensed by MIT, and its code can be shared on GitHub.

2.6. Visual Studio Code

The open-source code editor application Visual Studio Code was created by Microsoft for Windows, Linux, and macOS operating systems. Supports various types of programming languages such as C++, C#, Java, Python, PHP, and Go. In addition, Visual Code can identify the type of programming language used and change the color of the code according to its function. In addition, Visual Studio Code has been integrated into GitHub. One of the additional features is the ability to add extensions, which allows developers to add features that are not available in Visual Studio Code. According to Nufriani (2019).

3. METHODOLOGY

In this study, the research and development (R&D) method was used. The development model used in this study is the ADDIE instructional design model (Analysis-Design-Develop-Implement-Evaluate). This model is used to create educational products that can be accounted for by expenditure research. This is the next stage in the ADDIE development research model.

3.1. Analysis

In the ADDIE research development model, the initial step taken is to analyze the need to develop a new product, be it a model, method, or media, and assess the feasibility and requirements needed for the development. This process can be started by identifying problems in existing products. Along with the rapid development of information technology, institutions increasingly need information systems that can provide fast data access. This also has the potential to increase global visibility for the Air Navigation Engineering Study Program. At this stage, the author conducted a needs analysis for the D3 Air Navigation Engineering study program, which, although it already has a website under the official website of the Surabaya Aviation Polytechnic, still has minimal information and is rarely updated regarding the development of study program activities. In addition, the website also does not have a menu that functions as an information database containing research from lecturers and cadets, which should be widely accessible to facilitate the search for journals needed by visitors.

The ADDIE model serves as a structured approach for developing educational products, beginning with a thorough needs analysis. In the context of the D3 Air Navigation Engineering study program, this initial step is crucial for identifying gaps in the existing website and determining the necessary enhancements to improve information accessibility and visibility. The following sections outline key aspects of this analysis. Improved access to information can increase the program's global visibility, attracting more students and faculty. A well-structured website can facilitate collaboration and knowledge sharing among stakeholders in the aviation field. Conversely, while enhancing the website is essential, it is also important to consider the potential challenges, such as resource allocation and the need for ongoing maintenance to keep the content relevant and up-to-date, (Pujiastuti et al., 2025) (Mudjisuusatyo et al., 2024) (Hadi et al., 2024).

3.2. Design

The researcher designed the visualization of the information system using the PHP programming language with the Laravel framework to map the system effectively. The goal is for users to be able to operate the system that has been designed and built more easily. The web design is made as attractive as possible and is equipped with a shortcut menu that makes it easy for visitors to access the information they need.

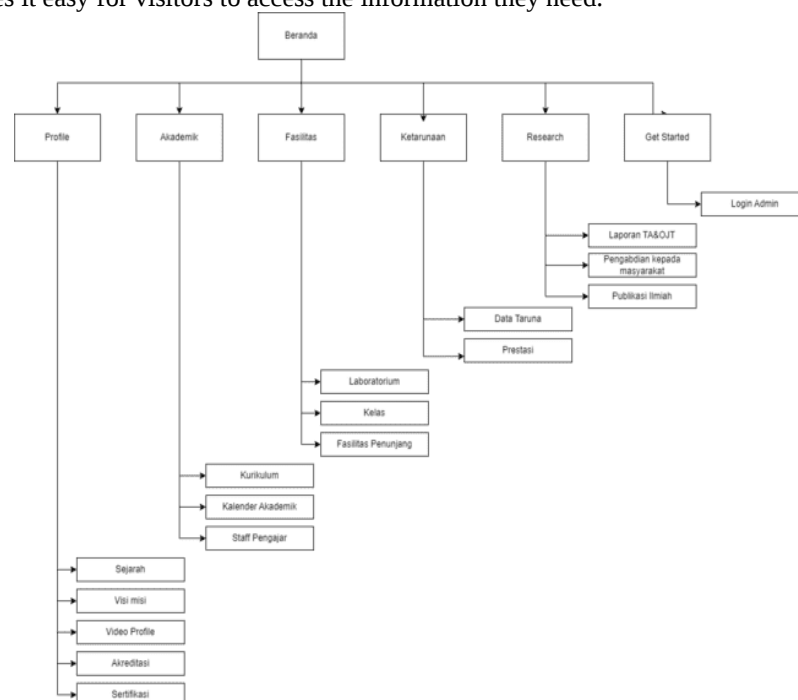


Figure 1. Research Design

The diagram above explains what menu features are available on the website; there are 7 main menus, and in each main menu, there are submenus that can be accessed by visitors. Here, visitors or website users do not need to log in to be able to access information or download documents on the website and to update the content in each menu, it can be accessed via the get Started menu, where the admin can log in with the username and password that have been registered in the database. The Get Started menu is intended for users who have access by registering and logging in. Users are divided into three, namely master admin, lecturers, and cadets.

3.3. Development

The development stage in the ADDIE research model involves a series of activities to realize the previously planned product design. At this stage, the conceptual framework that has been prepared is applied to a product that can be used, and at this stage, it explains each process that is going through in building a website for the Air

Navigation Engineering Study Program information system and database along with the software needed. The author built a website using the PHP language-based Laravel framework using the Visual Studio Code application.

3.4. Implementation

The implementation stage aims to obtain feedback on the product that has been developed. At this stage, the product is tested and evaluated by users to identify deficiencies or problems that need to be fixed. Researchers then make improvements and adjustments based on the input received so that the product can better suit user needs and development goals.

3.5. Validation Questionnaire

It is an instrument of questions answered by respondents according to what they experienced when using or testing the product in real-time. This questionnaire is used to find out the assessment and criticism of experts regarding the product being made

Table 1. Likert Scale

No.	Category	Score
1.	Strongly Agree	4
2.	Agree	3
3.	Disagree	2
4.	Strongly Disagree	1

Table 2. Assesment Score Weight

Score	Explanation
100 - 75%	Very feasible to use with a few revisions
74 - 50%	Quite feasible to use with revisions
49 – 25 %	Less feasible to use with many revisions
24 – 0 %	Not feasible to use

The table above shows the Likert scale of product validation, and the weight of the presentation value of the score obtained from the questionnaire is then converted into a percentage with the following formula:

$$\text{Feasibility \%} = (\text{Total assessment obtained}) / (\text{Maximum assessment}) \times 100\%$$

3.6. Evaluation

The evaluation stage in the ADDIE development model focuses on providing feedback to product users, which allows revisions based on evaluation results or unmet needs. This evaluation serves as the final step to ensure that the product has achieved the goals set in its development process, as well as measuring the extent to which the final results are by initial expectations. In this phase, the system is evaluated to ensure that the performance of the website is by the design and meets the needs of website users and operators. This information system successfully presents the information needed by the air navigation engineering study program and the needs of general public users.

4. RESEARCH RESULTS

4.1. Analysis

In this analysis stage, the author identified the needs of the D3 Air Navigation Engineering study program which currently only has a website integrated into the official page of the Surabaya Aviation Polytechnic. However, the website has minimal information, is rarely updated regarding study program activities, and does not have a special menu that functions as an information database. The absence of this feature makes it difficult for visitors to access research by lecturers and cadets, including finding the journals they need. Based on observations in this study, the author uses various supporting software. Visual Studio Code acts as the main tool for writing code with various programming languages, including PHP, which works with the Laravel framework as the main framework. Laragon is used as an intermediary tool to connect the website to MySQL, which functions as a data storage database. Laragon allows developers to build, test, and run dynamic websites locally before uploading them to an online server. In addition, Google Chrome is used to test and open the website being developed. The hardware specifications used in this study are a PC with an AMD Ryzen Gen 3 5000 series processor, a Windows 11 Home 64-bit operating system, 8 GB of RAM, and 512 GB of SSD storage.

4.2. Design

The main page of the website contains a main menu where each main menu has a submenu. These menus contain all information about the Air Navigation Engineering Study Program



Figure 2. Main Page



Figure 3. Main Page of Accreditation and Vision and Mission



Figure 4. Home page of Air Navigation Engineering Study Program profile



Figure 5. Home page of gallery



Figure 6. Home page of teaching staff

4.3. Development

4.3.1. Visual Studio Code Installation

Visual Studio Code is a digital code designer application with various formats. Without the need to install other applications, Visual Studio Code can also be used as a code extractor from the web in a browser so that it can be edited. In Visual Studio code, install several extensions

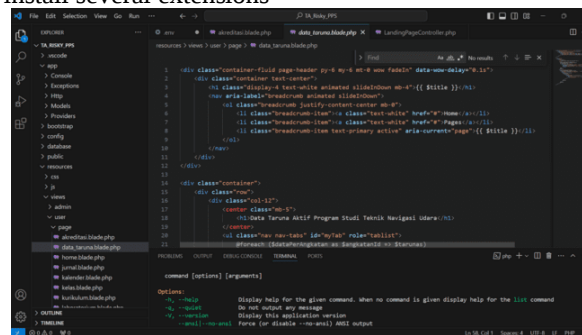


Figure 7. VS Code View

4.3.2. Laragon Installation

Laragon is a software bundle that includes a web server, a database, and other tools needed for web development. It facilitates the setup of a complete development environment with one installation. Laragon is very popular among web developers because of its ability to handle various development stacks such as PHP, Node.js, Python, and Ruby easily.



Figure 8. Laragon View

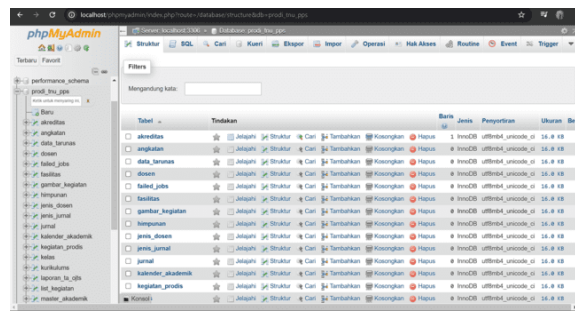


Figure 9. Database View

The image above shows the database processing feature of the Laragon application, which is opened using a browser application, a browser that can be.

Website Work Results

In coding using the Visual Studio Code application using the PHP programming language Laravel framework. The first thing the author did was install an extension on the VS Code application such as Laravel blade snippet to create a new folder TA_RISKY_PPS for coding, in the folder contains files that will be needed later to make it easier to do coding. The next is the front-end work according to the design that the author designed. Then the back-end work, such as a connection to the database and localhost, is tested on the website.

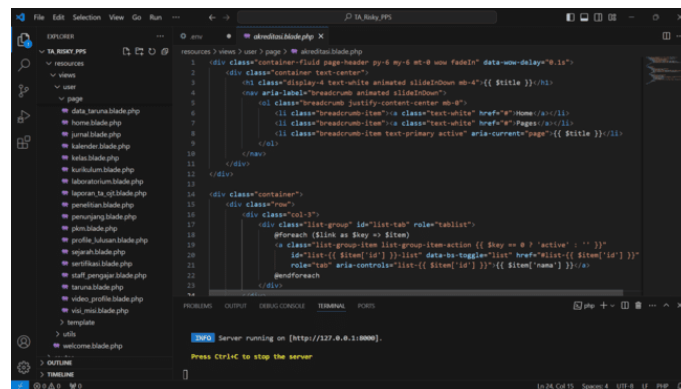


Figure 10. Front End Coding

The front end is the main display of a website that is seen by website users. The author does the coding in the TA_RISKY_PPS folder, in which some files have been prepared to facilitate the coding process. In each file there is already a template from the Laravel framework, then do the coding one by one on each menu that will be designed which will later be available on the website.

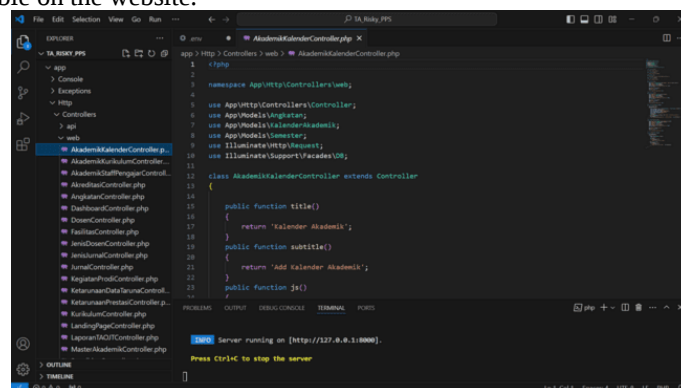


Figure 11. Back-End Coding

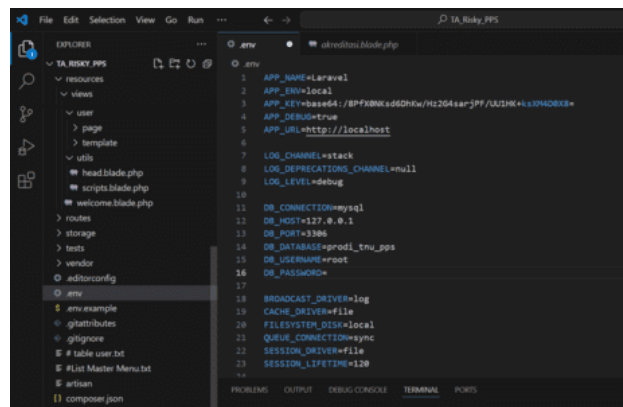


Figure 12. Coding Connection with Database

Figure 12, especially the red mark, displays data to be able to connect to the database and local host. For example, setting hosting, and the name of the database that will be entered into the MySQL database.



Figure 13. Laragon Application Display when Active

Figure 13 shows how to activate localhost through the Laragon application. First, click Start All to activate the local host, then click the database option to open access to the



Figure 14. phpMyAdmin Log-in Display

Figure 14 is the phpMyAdmin login display to access the database by entering the username root. Where the username is the same as that listed when coding.

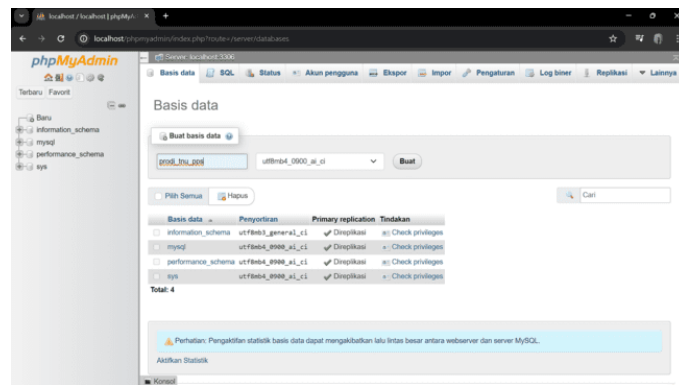


Figure 15. Database Dashboard

Figure 15 phpMyAdmin database dashboard. Click the new menu, and to connect the database with the coding results that are made, you must input the database name, namely `prod_tnu_pps`, which is listed in the coding shown in Figure 4.38, and then click Create.

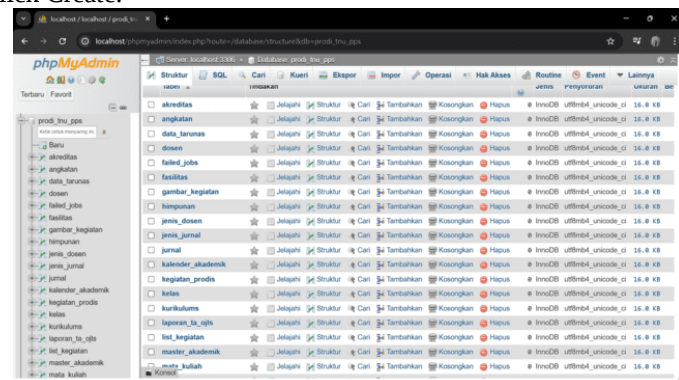


Figure 16. MySQL Database View



Figure 17. Terminal Connecting to the Server

To connect to the localhost server, you must first run a command on the terminal, namely `php artisan serve`, then the server running appears, and then click Ctrl + left click to open the website locally.

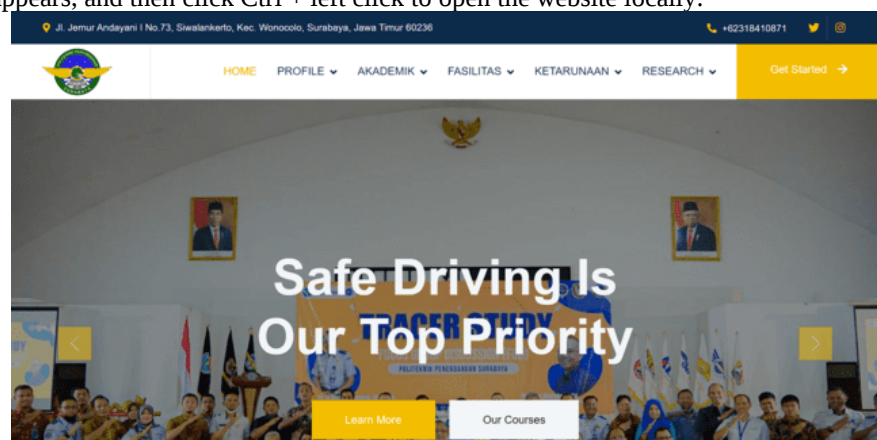


Figure 18. Main Menu View

After connecting to the server, the link immediately displays the main page of the website. Testing website performance by uploading documents and data in all menus via the admin feature.

4.3.3.Implementation

The implementation stage involves real-time system testing by involving material experts to evaluate the effectiveness of learning media.

Menu Function Test Results

Table 3. Menu Function Testing

Sub - Characteristics	Description	Suitability
Suitability	The website can provide functionality that is appropriate for specific user tasks and purposes	✓
Accuracy	The website can provide correct results according to needs. ✓	✓
Usability	The website can make it easier for users to access the information they need and make it easier for website managers to input the data they need	✓
Compatibility (Kompatibilitas)	The website can be accessed via the Chrome, Safari, and Firefox web browsers and can be accessed via PC and Smartphone hardware.	✓

At this stage, the website that has been connected to the server is tested for use in this case. The author makes a temporary hosting connection so that it can be accessed online for a trial period. This is needed to determine the performance of each menu and system designed so that the author knows if there are errors experienced by website visitors; the author can find out and make improvements. Detailed implementation.

Testing the creation of lecturer, cadet, and admin accounts.

The first stage is to log in for the admin because only the admin can edit each menu. Where the admin here can be added directly through the database or can be added via the local host website in the following way.

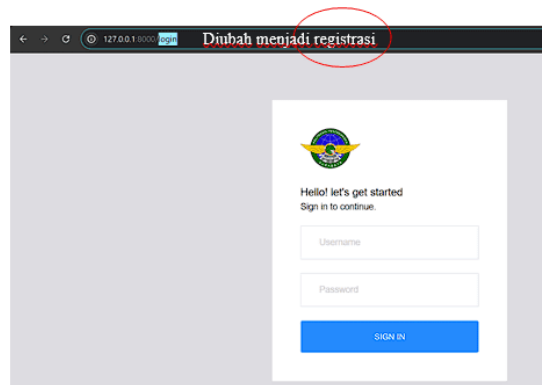


Figure 19 .Registration

Next, refresh to enter the login menu by entering the admin account and password that have been registered in the column provided. To register the admin, namely changing the localhost address that was previously written as Login to Registration, later the web page will refresh automatically, and a column will appear to register the username and password to add a new admin.

Testing Data Upload

After logging in, the admin enters the dashboard, which contains a menu for editing the data displayed on the landing page shown in Figure 13. Here the author conducts a trial to upload data on the profile menu, namely accreditation in the form of an image in which there is a data name and description, then selects the file to be uploaded on the choose file button after all is filled in, and then clicks submit. Then check the main menu page to see whether the data that

has been uploaded appears on the intended menu page. Figure 14 shows that the menu page already displays the uploaded data, indicating that the website is working normally.

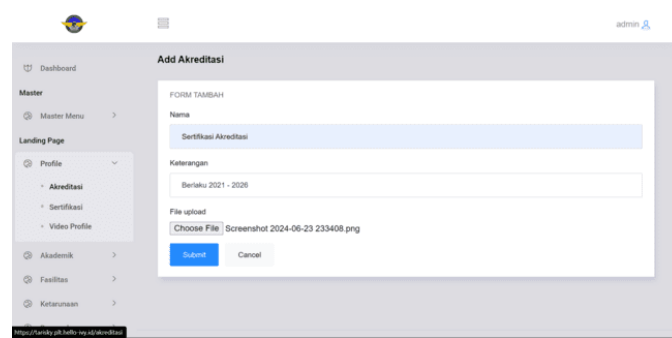


Figure 20. Display of the edit menu for the accreditation profile



Figure 21. Display of the accreditation menu after uploading

5. DISCUSSION

After the website was tested, the results of the user assessment sample provided positive feedback on the system that had been presented on the website. Visitors considered that the website could be easily accessed and quickly delivered from one menu to another, the visualization could attract visitors, and the information presented was complete so this information system was effective in helping the general public to find information more easily. All systems and menus presented by this website have been validated by expert lecturers, and it has been proven that this website is needed by the air navigation engineering study program.

6. CONCLUSION AND RECOMMENDATION

The design process begins with a literature review of previous research literature. Furthermore, the author prepares tools and materials in the form of supporting applications for creating websites, such as Visual Studio Code, Laragon, and the installation of the PHP Laravel programming language and browser. The author also looks for references about coding from the internet to be studied and processed to develop the website as desired. The final process involves creating a data storage system and setting up a database to test the website and function as expected.

The website's working process involves running the Laragon application to activate the database and connect it to the local host server. After that, the website can be accessed via a browser on the author's device and other devices as a local host. To access the website from another device, you need to enter the website address on the computer being used. Admins can add accounts, change passwords, and update menus on the website. Meanwhile, users can access the website and all available menus without having to log in.

FURTHER RESEARCH

It is hoped that the study programs at the Surabaya Aviation Polytechnic will develop a website-based information system to integrate with the main site of the Surabaya Aviation Polytechnic and the information system sites of all existing study programs.

It is hoped that additional features will be added to support study program activities, including learning features such as modules, KBM (Teaching and Learning Activities) activities, and facilities that allow cadets to interact with the data needed by the study program.

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