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Design and Development of a Virtual Public Complaint Service System for the Medan City Cooperatives and Small and Medium Enterprises (UKM) Service Based on a Website

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ABSTRACT
Modern technology has developed rapidly, providing various solutions to facilitate activities and work. The Medan City Cooperatives and Small and Medium Enterprises (UKM) Service, which handles various complaints from the public regarding SME services, still uses manual methods in its complaint process. This manual method often causes various problems, such as delays in handling complaints and difficulties in monitoring complaint status. To overcome these problems, this study aims to design and build a website-based virtual public complaint service system application. This study uses data collection methods through observation, interviews, and documentation. In developing the application, the Personal Home Page (PHP) method is applied because of its flexibility in handling changing needs during the development process. Direct communication with clients is the main focus in this method. This application was developed using Visual Studio Code as an editor, and MySQL as a database, thus accelerating the application development process. The results of this study are in the form of a public complaint information system application that can facilitate the public and the Medan City Cooperatives and Small and Medium Enterprises Service in managing and responding to complaints effectively.

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INTRODUCTION

InTechnological advances have brought many benefits to society, including increasing access to information and public services. Modern technology is not only capable of storing and transmitting data, but also contributing to realizing the goals and aspirations of national development. In recent years, the development of information technology has produced various significant innovations that affect human welfare. One such innovation is the internet, which is an important discovery in modern life. The internet enables the creation of a web-based information system that functions as a means of direct interaction between the government and the public in improving the quality of public services (Sahfitri et al., 2023).

One of the main benefits of internet technology is its ability to provide access to information. Through the internet, people can easily access various information, ranging from that produced by individuals to relevant global information. This access makes it easier for

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people to gain new knowledge, both simple and complex. In addition, the internet also allows people to find out about changes in information made by the government, so that people can be more critical of existing policies. This critical attitude, in turn, helps the government evaluate and improve work programs that have been implemented (Rohmatun et al., 2017).

Along with the development of information systems designed for the benefit of the community, various web-based systems have emerged that allow the public to access and search for information more easily. By utilizing advances in information technology, the government can improve the quality of public services, accelerate access to information, and realize more effective and transparent government management. The application of information technology to public services is a strategic step to create better relations between the government and the community (Ikhwan & Lubis, 2023).

One form of community participation in development is through public complaints. The complaint system allows the public to monitor government performance and convey aspirations and reports that can be used as material for policy evaluation. With the complaint system, the government can identify problems in the community quickly, precisely, and accurately, and provide relevant solutions. This makes public complaints an important component in responsive and inclusive governance (Hardiansah et al., 2017).

To support this, a web-based public complaint service system was developed for the Medan City Cooperatives and Small and Medium Enterprises (UKM) Service. This system is designed to facilitate direct interaction between the public and the government, with features such as filing complaints, tracking complaint status, and providing feedback. In its development, this system emphasizes the user experience so that it can be used easily, even by people who are less familiar with technology. In addition, this system is equipped with additional features such as complaint categories, notifications, and data analysis to help the Cooperatives and Small and Medium Enterprises (UKM) Service in making more effective decisions. The research question is how to design a virtual public complaint service system for the Medan City Cooperatives and Small and Medium Enterprises (UKM) Service so that it can be used easily by the public.

With the existence of a web-based public complaint service system, it is expected that the quality of public services will increase, the relationship between the government and the community will be closer, and a conducive environment will be created for the growth of micro, small, and medium enterprises in Medan City. This system is a strategic solution to increase community involvement in development and encourage transparency in public services.

METHODS

This study aims to design and create a virtual complaint service system for the Medan City Cooperatives and Small and Medium Enterprises (UKM) Service which can be accessed via the website.

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Literature Review

Information Technology and Public Services

The development of information technology has had a major impact on various aspects of life, including the public service sector. Modern technology such as web-based information systems has enabled the government to increase efficiency and transparency in delivering services to the public. According to Sahfitri et al. (2023), web-based information systems are one of the important innovations that enable direct interaction between the government and the public, thus supporting the creation of more responsive and effective public services. The internet has become the main tool in providing access to information. Rohmatun et al. (2017) explain that the internet allows the public to obtain various types of information quickly and easily. With the internet, the public can more critically monitor government policies and provide input for improving work programs that have been implemented. This makes the internet an important means of strengthening relations between the public and the government.

Web-Based Information System for Complaint Services

Web-based information systems have been widely used to improve public services, one of which is in the form of public complaint services. According to Ikhwan and Lubis (2023), the use of information technology in complaint services can help the government manage public complaints more effectively and transparently. This system allows the public to submit complaints, track complaint status, and receive feedback from the government easily. Public complaints are a form of active participation in development. Hardiansah et al. (2017) emphasized that the complaint system not only functions as a means to convey complaints, but also as an evaluation tool for the government to assess the effectiveness of the policies implemented. With the complaint system, the government can quickly identify and resolve problems in the community.

PHP (Hypertext Preprocessor)

According to Kadir A, PHP is a programming language designed to create web applications. PHP is a server-side language, where data processing is done on the server side. This is different from JavaScript, which is processed on the client side. And the use of MySQL as a database management system (DBMS) is also very common in the development of website-based sales applications. MySQL can handle large amounts of data with good performance and is easy to integrate with PHP. (Supiyandi, S., et al. 2023).

Web-Based System Design for Public Complaints

The design of a web-based public complaint service system must consider the user experience aspect so that it can be used by all groups, including people who are less familiar with technology. One important aspect in application development is system design and user interface (UI). Good design can improve the user experience (UX) and make it easier for users to interact with the system. According to (Wibowo. 2020). In addition, features such as complaint categories, notifications, and data analysis are very important to help the government manage complaints efficiently. According to Ikhwan and Lubis (2023), a well-designed system can increase public participation and strengthen relations between the

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government and the community. The implementation of a web-based public complaint service system at the Medan City Cooperatives and Small and Medium Enterprises (UKM) Service aims to improve the quality of public services and support the growth of MSMEs. With this system, the public can submit complaints related to services or policies directly, so that the government can respond quickly and accurately. This system is expected to be a strategic step in creating a more transparent and participatory government.

Analysis And Design

System Design

a. Hardware Design

System requirements analysis is conducted to determine the technology to be implemented during system development. The following are the details of the hardware specifications used in this study:

1) Operating System: Windows 10.
2) Processor: Intel Core i3.
3) RAM: Minimum 8GB.
4) Printer

These hardware specifications are designed to support the smooth operation of website-based sales applications in the Public Complaints Virtual Service System for the Cooperatives and Small and Medium Enterprises (UKM) Service, so that the transaction process, data recording, and report generation run efficiently and without interruption.

b. Software DesignThe following is the software required by the user to run the system:

1) PHP version 7.4.
2) PhpMyAdmin version 5.0.2
3) MySQL (Xampp)
4) Visual Studio Code (Editor)
5) Browser: Google Chrome

This software is chosen to ensure fast, stable, and easy-to-use system development in data management, while MySQL and PhpMyAdmin are used to manage the application database. Visual Studio Code as an editor and Google Chrome as a browser will ensure optimal access for users of this web-based application.

With this combination of hardware and software that has been designed, it is hoped thatVirtual Public Complaint Service System for the Cooperatives and Small and Medium Enterprises (UKM) Service)website-based can run well in the North Sumatra provincial government. And here is the system design:

1) Use Case Diagram

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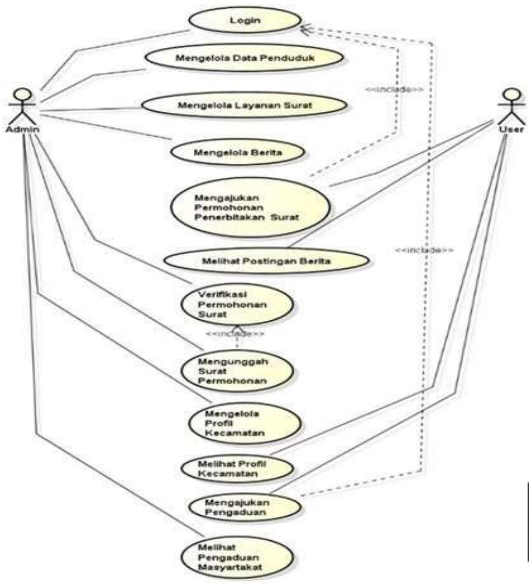

Figure 1. Use Case Diagram

The interaction between actors and systems is designed to improve the efficiency of complaint handling and ensure transparency and accountability. The public can easily file complaints regarding SME services and monitor the process. Service officers ensure that complaints are handled professionally by managing data and providing responses. Meanwhile, the System Admin maintains the continuity of system operations and ensures data security and availability. This diagram provides an overview of the structured process flow to support more effective and responsive complaint services.

2) Class Diagram

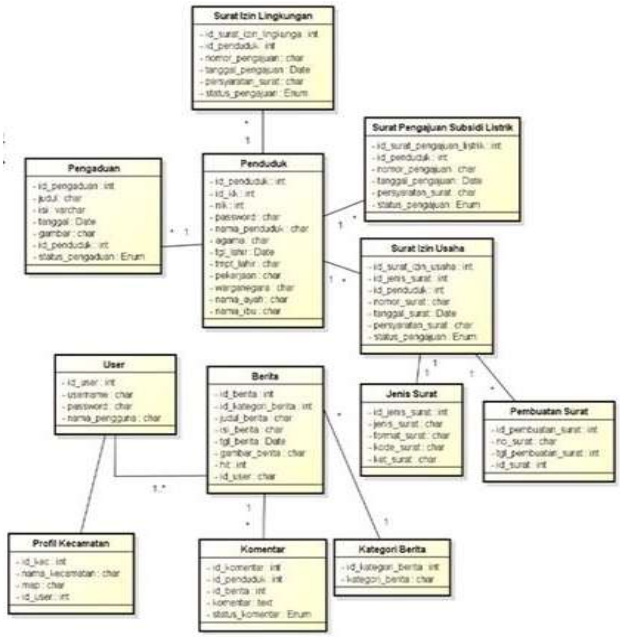

Figure 2. Class Diagram

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Class Diagram for a virtual public complaint service system intended for the Medan City Cooperatives and Small and Medium Enterprises (UKM) Office based on a website illustrates the relationship between objects involved in managing public complaints. In this diagram, there are several main classes, each of which has relevant attributes and methods.

The first class is User, which has attributes such as userID, username, password, email, and role, which determine the type of user, whether admin or regular user. The methods in this class include register(), login(), logout(), and updateProfile(), which allow users to register, log in, log out, and update their profiles. There is a Complaint class that functions to store data about complaints filed by users. The attributes in this class include complaintID, userID, title, description, status, Complaintdate, and Responsedate. The methods in this class include submitComplaint(), updateStatus(), and trackStatus(), which allow users to file complaints, update their status, and track the progress of their complaints.

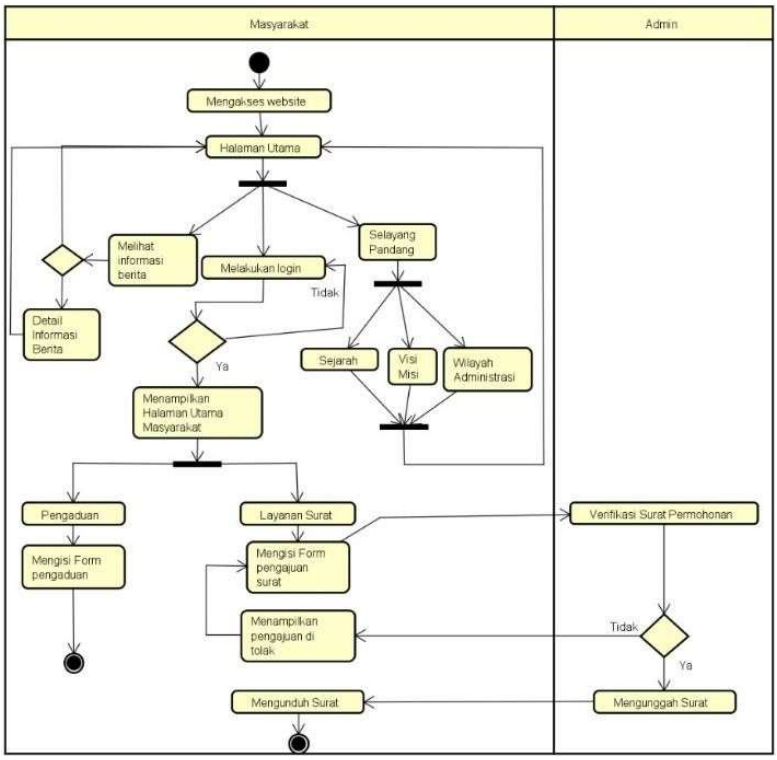

Figure 3. Activity Diagram

This Activity Diagram illustrates the virtual flow of the public complaint process. The process begins when the public fills out a complaint form on the system. After the form is filled out, the system will validate the data provided. If the data is declared valid, the system will record the complaint, provide a complaint number to the user, and forward the complaint to the Service Officer. Furthermore, the officer will process the complaint until it is completed. During the process, the complaint status is continuously updated. After the complaint has been processed, the officer provides an official response, and the system sends a notification to the public regarding the resolution of the complaint.

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IMPLEMENTATION AND TESTING

System Implementation

The main menu interface on the website-based public complaint virtual service system plays an important role as the first display that appears when users access the application. The main menu design is designed to make it easier for users to navigate the various features available. The main purpose of this menu is to provide an intuitive user experience, so that people can quickly find the information or functions they need, such as creating a new complaint, viewing complaint status, and accessing service guides.

The main menu also includes a login feature for registered users, as well as a registration option for new users who want to file a complaint or track the status of their complaint. With a simple yet functional design, this main menu aims to make it easier for the public, including small and medium business actors, to submit complaints or input to the Medan City Cooperatives and SMEs Service.

The main menu display also displays navigation to related information pages, such as current news, government policies, and SME support programs. All elements in the main menu are designed to provide quick access and minimize user confusion. The following is a display of the interface for the login menu, which is designed to be user-friendly with a focus on ease of access and clarity of information. This feature allows users to log in to the system, utilize services, and submit public complaints smoothly.

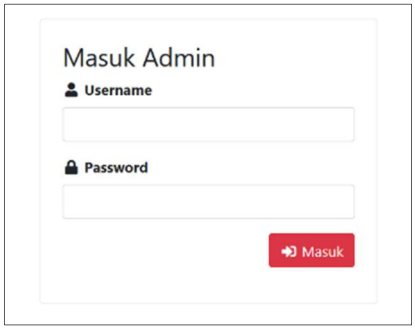

Figure 4. Login Menu Display

The following is a display of the Dashboard Menu shown in the image below.

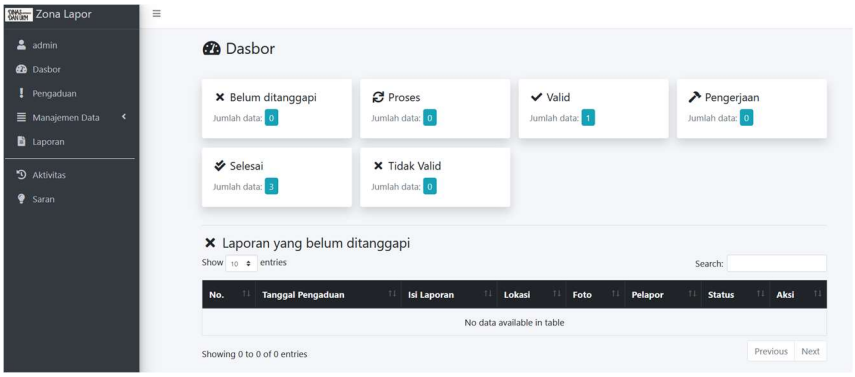

Figure 5. Dashboard Menu View

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Here is the Menu displaycomplaint datawhich is shown in the image below.

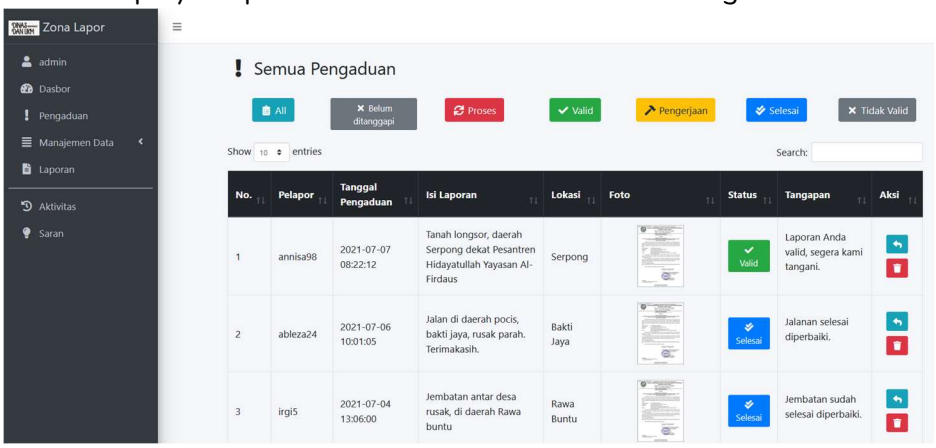

Figure 6. Complaint data menu display

Here is the Menu displayuserwhich is shown in the image below.

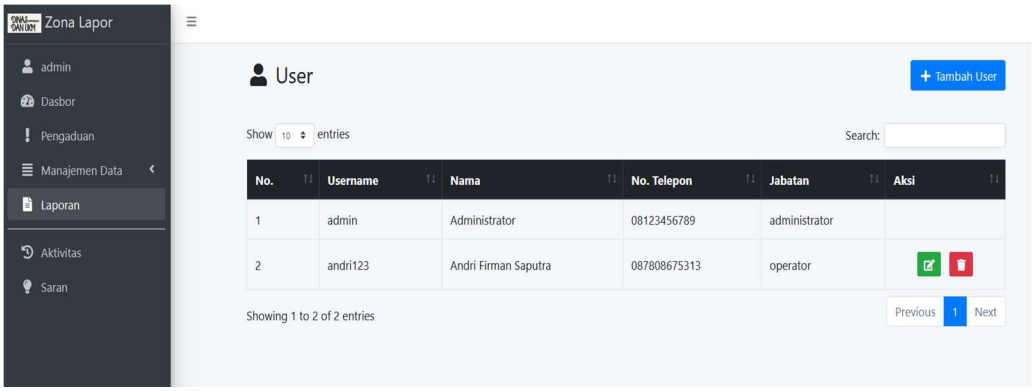

Figure 7. User Menu Display

In the website-based public complaint virtual service system, the user menu functions to provide access for users to manage their complaints and utilize other features relevant to their needs. This menu is designed to provide ease and comfort in interacting with the system. Here is the Menu displaycommunities participating in filing complaints in the development of SMEswhich is shown in the image below.

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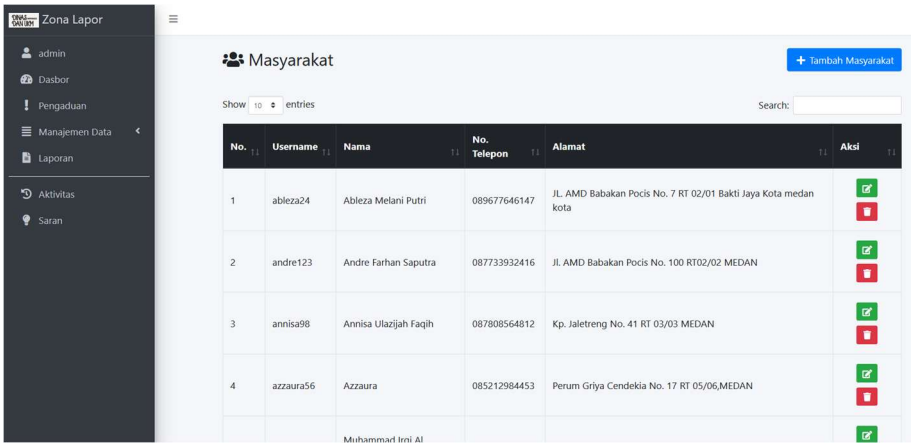

Figure 8. Community Menu Display

Here is the Menu displayReport datacommunity related to SMEs shown in the image below.

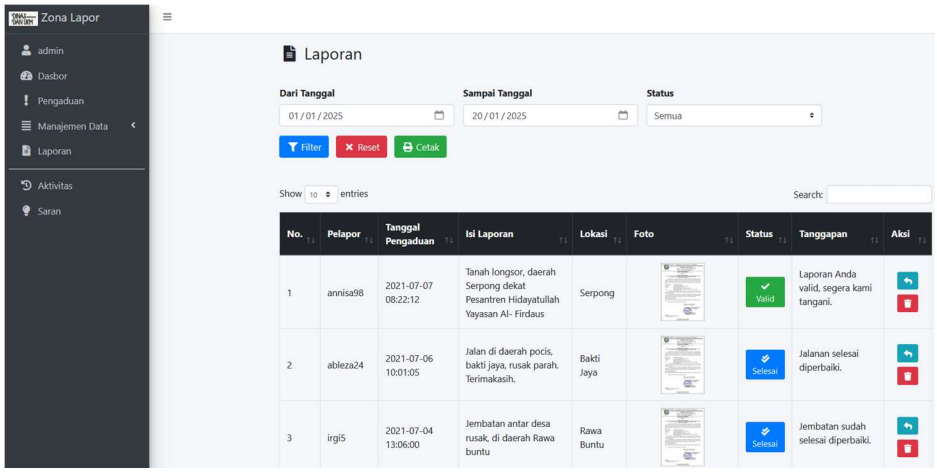

Figure 9. Report Menu View

Here is the display of Menu Dor suggestions from the community related to the North Sumatra Cooperative and SME Servicewhich is shown in the image below.

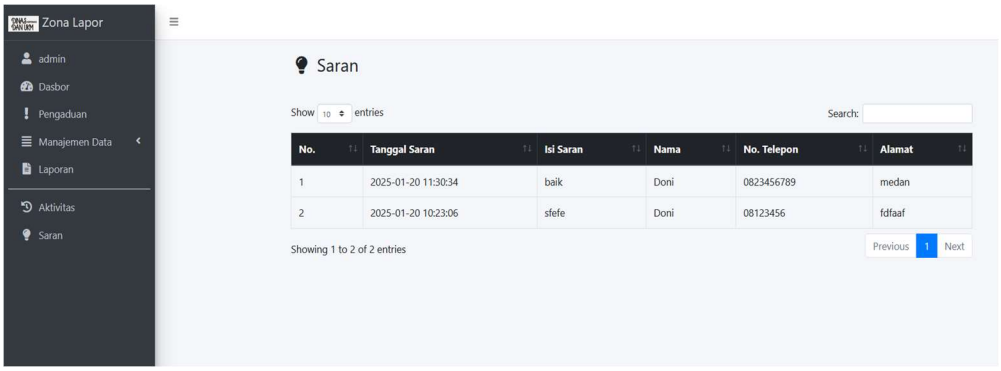

Figure 10. Display of the community suggestion menu

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Here is the front viewweb existsMenuhome, report list, account list, login, input suggestions related to SMEswhich is shown in the image below.

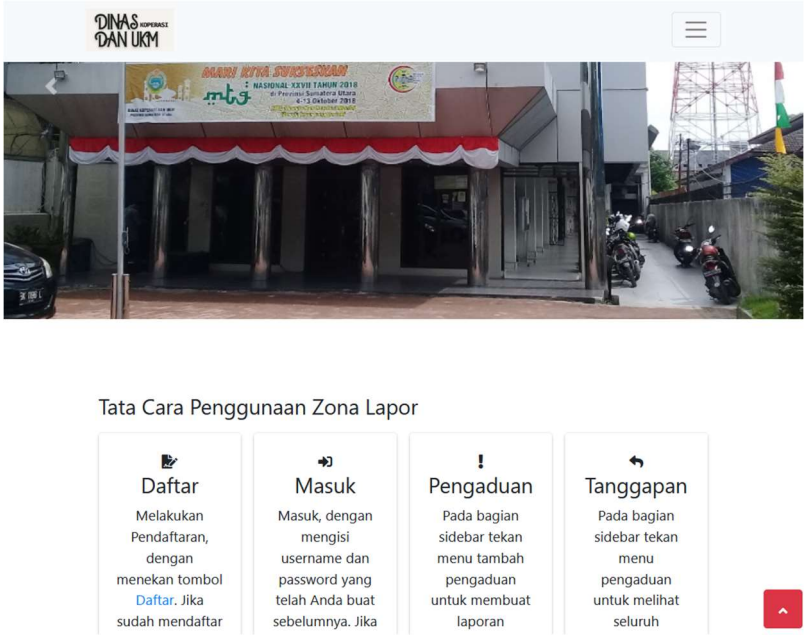

Figure 11. Web display menu display

System Testing

System testing is conducted to identify potential errors or deficiencies in the software that has been developed, to ensure that the software can meet the criteria and objectives that have been set at the stage of designing the virtual public complaint service system. This testing aims to evaluate whether the system can run well and provide convenience for the community and small and medium enterprises (SMEs) in submitting their complaints to the Medan City Cooperative and SME Service.

In general, software testing is divided into two main categories, namely Black Box Testing and White Box Testing. In this study, system testing was carried out with a functional approach, which includes alpha and beta testing. The testing applied uses the Black Box Testing method, which focuses on the functional aspects of the system without considering its internal structure.

This test plan includes testing every function in the application to ensure that all features work as expected by users. This testing will cover several scenarios, such as:

a. Complaint Submission: Tests whether users can easily submit complaints through the available forms.
b. Complaint Status Monitoring: Ensuring that users can monitor the status of their complaints in real-time.
c. Search Feature: Tests the ease of users in searching for complaints that have been submitted or searching for related information.

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d. User Registration and Login: Ensure that the registration and login process runs smoothly, for both new and existing users.

With this testing approach, users do not need to know how the internal structure of the system works, which means that only the results and outputs of each function being tested are the main concern. Through this testing, it is expected that all potential problems can be found, both in terms of application functionality and interactions between features, to ensure that the virtual public complaint service system can run effectively, efficiently, and can be easily accessed by the entire community and SMEs in Medan City.

Table 1: Black-box testingVirtual Public Complaint Service System for Cooperatives and (UKM) Services.

No	System Functions	Test Description	Expected results	Status
1	Submission of Complaints	Testing whether users can fill out and submit complaint forms	Users can submit complaints with clear and accurate information.	Good
2	Complaint Status Monitoring	Test whether users can see the status of complaints that have been submitted.	Users can view the current status of their submitted complaint.	Good
3	Complaint Search	Testing whether the search feature is working properly	Users can search for complaints based on keywords and get relevant results.	Good
4	New User Registration	Testing whether new users can register to create an account	New users can register with valid data and successfully create an account.	Good
5	Login Process	Tests whether a user can login using a registered account.	Users can login to the system by entering the correct username and password.	Good
6	Complaint Notification Delivery	Test whether the system sends a notification after a complaint is submitted.	The user receives a notification stating that the complaint has been successfully submitted.	Good
7	User Data Security	Test whether user data is properly protected and encrypted	User data is safe, no data is leaked or can be accessed without permission.	Good
8	Access Admin Menu	Test whether admins can access and manage public complaints	Admins can access the system to view and	Good

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No	System Functions	Test Description	Expected results	Status
			respond to public complaints.	
9	Complaint Management by Admin	Testing whether the admin can respond to complaints that have been received	Admin can provide responses or solutions to existing complaints.	Good
10	Responsiveness and Accessibility	Test whether the system can be accessed properly on various devices (PC, smartphone)	The system is well accessible on various types of devices and screen resolutions.	Good

Source: Author 2024

This table shows the tests performed to ensure the system functionality is working properly as expected.

CONCLUSION

Based on the results of the tests conducted, the virtual service system for public complaints for the Medan City Cooperatives and Small and Medium Enterprises (UKM) Office based on the website has functioned well and in accordance with the stated objectives. All main features, such as filing complaints, monitoring status, searching for complaints, and user registration and login, work effectively and are easily accessible. The simple yet functional system interface makes it easy for users to navigate the application smoothly. This system has also maintained the security of user data well and can be accessed optimally on various devices, both desktop and mobile. The complaint process can be processed quickly, and complaint notifications are successfully received by users. In addition, admins can easily manage and respond to complaints received. Overall, this system has successfully increased efficiency, transparency, and public participation in providing input to the Medan City Cooperatives and SMEs Service. With testing showing positive results, this system is ready to be implemented further with ongoing development to improve its performance and functionality.

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