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# Development of a Web-Based and Mobile Psychological Consultation Queue Service at DP3AKB Balikpapan with API

Ihsan[1], Danar Retno Sari[2], Armin[3], Angga Wahyu Aditya[4], Zulkarnain[5], Candra Irawan[6]

[1,2,3,4,5] Department of Electrical Engineering, Balikpapan State Polytechnic, Indonesia
[6] Department of Civil Engineering, Balikpapan State Polytechnic, Indonesia

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✉ Corresponding Author
**Ihsan**
Balikpapan State Polytechnic
ihsan@poltekba.ac.id

**ABSTRACT**

The increasing demand for effective public services necessitates a more efficient queue management system. This study aims to design and implement a real-time online queue application for web and mobile platforms, using the Django and Flutter frameworks, and integrating Application Programming Interfaces (APIs) as a bridge between the two platforms. The methodology applied is software engineering with a case study approach at DP3AKB, Balikpapan City. The system design includes digitizing the registration, validation, consultation scheduling, and psychological reporting stages. The developed application enables users to register independently and provides administrators and psychologists with real-time access to manage client data through a responsive and secure interface. The results of the study, based on 19 respondents who assessed 15 questions via a Likert scale questionnaire, with an average percentage of 94.73%, indicate very satisfactory results. This suggests that the system improves service efficiency, speeds up the registration and consultation process, and produces more accurate report data. The development of this system can overcome various obstacles from manual systems and support digital transformation in psychological consultation services.

## INTRODUCTION

Developments in information and communication technology (ICT), such as cloud computing, APIs, and real-time monitoring systems, have driven significant transformations in public services [1]. Cloud computing provides cost efficiency, storage flexibility, and data access from multiple locations, although challenges such as security and infrastructure remain concerns [2]. This research was conducted in collaboration with the Balikpapan City Family Welfare Development Agency (DP3AKB), a local government agency tasked with providing services and protection to women, children, and families. DP3AKB also manages empowerment and social welfare programs aimed at improving the quality of life for families and communities, particularly through the Family Learning Center (Puspaga) service. This service focuses on providing counseling and support for families, particularly children, in addressing challenges.

The current problem is that the online registration system at Puspaga Harapan – DP3AKB Balikpapan City is still manual, where users must first contact the service via WhatsApp to register, and then they will be scheduled according to service availability [3]. This system has several limitations, such as uncertain wait times, a lack of transparency in the queuing process, and difficulties in managing user data in an automated and structured manner. This can lead to scheduling inefficiencies, potential service delays, and difficulty for users in determining their queue status in real-time [4]. Apart from that, psychologists who are tasked with preparing various reports, including daily, monthly, quarterly, semesterly, and annual reports, still do so

manually, which takes a considerable amount of time [5]. By developing the concept of API and real-time monitoring, digital queuing system solutions can be more integrated, responsive, and easily accessible [6]. APIs enable devices and systems to communicate with each other and share data in real-time, allowing users to obtain information regarding queue status, estimated wait times, and notifications directly through mobile or web applications [7].

Research related to the web-based and mobile-based information system for the DP3AKB with API integration. Based on this, research on the development of public service information systems continues. One such study is by Wowo Trianto (2021). This study analyzes the registration queue system at the Cimahi City Community Health Center using methods from the field of queuing theory. The system's weakness is that it still relies on manual registration methods, thereby not completely reducing waiting times, and lacks digital technology integration that can provide real-time user information [8]. Research by Sugito et al. (2020) evaluated the queuing system at the Semarang City Population and Civil Registration Office. This system uses queue analysis methods to measure visitor performance and waiting times. Weaknesses: The existing system remains manual and does not provide users with notifications regarding queue status. There is no digital system that allows users to register online [9]. Research by Asri Dheajeng Imani et al. (2022) focuses on the development of an Android-based online client registration system at Balung Regional Hospital, which aims to improve registration efficiency and reduce client waiting times. However, the application is still developed using Dart and Firebase, meaning it only supports Android versions 4.1 (Jelly Bean) to Android 11 [10]. These three studies demonstrate progress in digital queuing service systems in Indonesia, while also highlighting remaining weaknesses, such as reliance on manual systems and inadequate technology integration.

The purpose of this research is to develop and analyze a web-based and mobile-based public service information system for the Family Learning Center (Puspaga) Service of the Balikpapan City DP3AKB. This system aims to increase efficiency and transparency in the queuing process, reduce uncertainty in waiting times, and facilitate automated and structured management of user data [11]. In addition, it provides technology-based solutions that enable users to obtain queue status information, estimated waiting times, and notifications directly through the application, thereby improving service quality and accelerating the creation of psychological reports [12].

The novelty of this research lies in the implementation of a digital queuing system integrated with API technology, as well as the more advanced real-time monitoring of Puspaga services. This research develops a web- and mobile-based system that enables real-time data communication between users and the system [13]. In this study, the proposed solution will provide easy online registration, real-time queue status transparency, and accurate wait time estimates, thereby increasing user efficiency and convenience, while reducing reliance on manual systems. Another novelty is improved data integration and more automated psychological reporting, simplifying the previously time-consuming report generation process. Thus, this study brings significant innovation to improving the quality of public services through more comprehensive technology integration.

To ensure the robustness and functional validity of the proposed system, Black Box Testing was applied as the principal evaluation method. This technique assesses the system’s functionality based on input–output behavior without examining internal code structures. The testing process systematically evaluated critical components of the system, including the online registration module, queue management interface, notification mechanism, and automated psychological report generation features. The results of the Black Box Testing demonstrated that each functional module performed in accordance with the predefined system requirements, indicating high reliability, accuracy, and operational consistency across various test scenarios [14].

## METHODS

### Research Stages

This research employs a Research and Development (R&D) approach, aiming to design, implement, and test a web and mobile-based Puspaga Harapan DP3AKB Balikpapan service information system. The research stages include (1) literature study, (2) user needs analysis, (3) system design, (4) software implementation, and (5) testing and evaluation [15]. During development, we employed the Agile Software Development method, utilizing the Scrum framework, to create a DP3AKB Balikpapan service information system that integrates web and mobile components. Backend development utilizes Django (Python) and Django REST Framework (DRF) to construct a RESTful API that serves as a bridge between web and mobile applications. Data exchange is done in JSON format, with JSON Web Token (JWT) for authentication and role-based access control (RBAC) to manage user access rights. The web application is built with Django, while the mobile application is developed using Flutter. PostgreSQL is used as the central database, implemented on an Ubuntu 22.04 LTS server with Nginx as the web server. This framework enables the team to respond to evolving user needs progressively through stages, such as: [16].

a. Needs Identification Stage
   At this stage, the research team collaborated with relevant parties at the Balikpapan City DP3AKB Puspaga to identify and understand system requirements. This requirements gathering process was conducted through two primary methods: interviews and direct observation
b. Product Backlog Development
   The Product Backlog is a prioritized list of all the features and tasks that must be completed to build the desired system. This backlog is dynamic and can be updated based on user feedback and changes that occur during the development process. These include requirements categorization, prioritization, time and resource estimation, and other related tasks.
c. Sprint Planning Stage
   At this stage, developers collaborate with stakeholders to evaluate and discuss in detail, determining the priorities for developing the most crucial and urgent features or parts of the system to be worked on. Select several items from the product backlog, a complete list of features, improvements, and system requirements that have been collected to be included in the sprint backlog, which will be worked on within a specific sprint timeframe.
d. Sprint Execution Stage
   Development is carried out in planned steps, following the priority sequence established in the sprint backlog. Each sprint lasts a specific amount of time and focuses on completing several features or system components selected from the product backlog. This process involves design, programming, initial testing, and the integration of new functionality into the system.
e. Daily Scrum Stage
   Developers hold a short daily meeting that usually lasts for 15 minutes, held to ensure the development team stays on track and discusses project development to report progress, challenges, and next action plans.
f. Sprint Review Stage
   At the end of the sprint, the team conducts a review with stakeholders to demonstrate the system increment and receive direct feedback, as is the practice in inspection system development and graphic design [15].
g. Retrospective Stage
   Internal team evaluation to identify what went well, what needs to be improved, and a plan for improving the development process for the next sprint [17].

### Data Collection and Analysis Techniques

The questionnaire data were then analyzed using quantitative descriptive analysis, calculating the total score, percentage, and average for each indicator to assess the level of satisfaction, ease of use, and effectiveness of the system. The percentage calculation results for each question item were interpreted into assessment categories such as very suitable, suitable, or quite suitable to describe the level of user acceptance of the developed information system [18].

This was done to ensure the digitalization system would conform to the specified format. Furthermore, relevant parties were asked to complete a questionnaire. The data was then analyzed using a Likert scale with 19 respondents and 15 questions [19]. The formula is as follows:

$$Total\ Score = Score\ T \times Pn$$

$$Total\ maximum\ score = number\ of\ respondents\ x\ highest\ score$$

$$Feasibility\ Index = \frac{Total\ Score}{Maximum\ Score}\ x\ 100$$

## RESULTS AND DISCUSSION

The system was developed using Agile methods in stages, taking into account feedback from Puspaga. One of the main components is the Application Programming Interface (API) built using the Django REST Framework. This API connects web and mobile applications (Flutter), enabling real-time data synchronization for features such as queue status, consultation schedules, and psychologist report updates. The API's primary contribution is seen in improving data access speed and information consistency across platforms. Challenges faced included setting up secure and efficient endpoints, handling authentication using JWT Tokens, and optimizing response times when data loads increase. Test results showed the API was able to maintain stable performance, indicating that the API integration was effective in supporting the overall system.

### Identification Stage

This stage results in a design of the system substance based on users and databases:

a. Usecase Diagram Design

In this system, there are three leading roles: Client, Psychologist, and Admin. Patients can register an account, log in, and complete and submit consultation forms online. Psychologists have additional access, including the ability to view data, verify forms approved by the administrator, and print consultation reports. Meanwhile, the admin has full access to all system features, including viewing data, registering patient forms, selecting the psychologist on duty, and printing reports. Figure 1 shows the online queue use case diagram below.

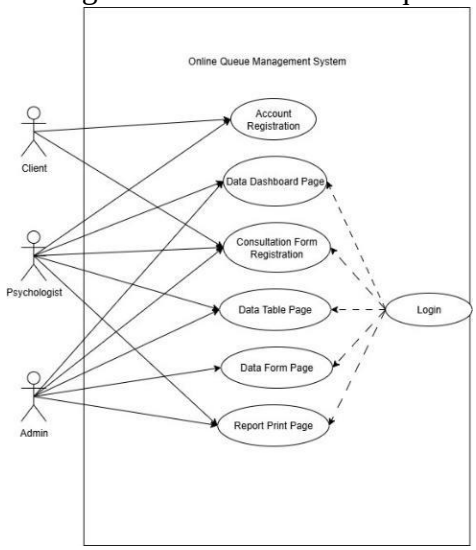


**Figure 1.** Online Queue Use Case Diagram

b. Database Schema Diagram Design

The psychological consultation service information system at Puspaga Harapan Balikpapan City is built on several main tables in the database, including users, user forms, case types, and psychologist users. Figure 2 shows the database Schema Diagram of the Information System Service.

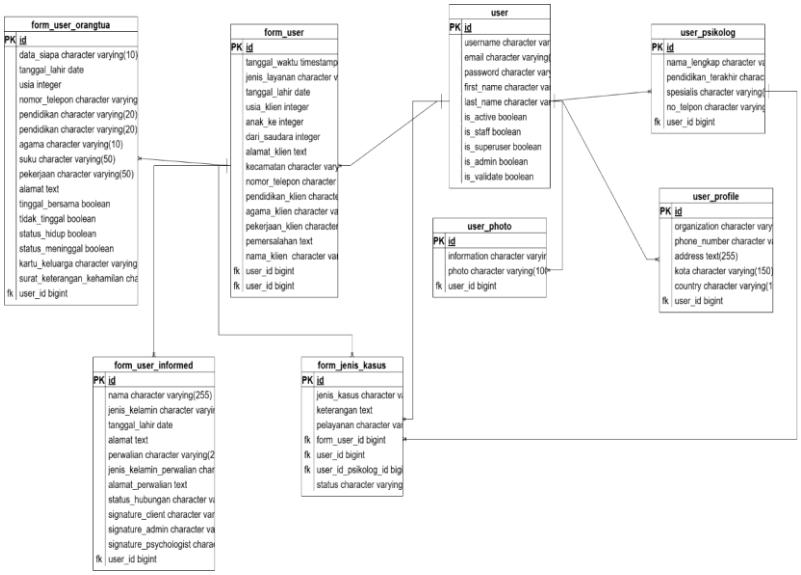


**Figure 2.** Schema Database Diagram Information System Services

The user table stores basic information for all users, including patients, administrators, and psychologists, as well as login details and access roles. The user form table is used to record initial patient data, including identity and a brief medical history, required for consultations. The case type table records the type of problem or service the patient needs and connects them directly to the treating psychologist. The User or Psychologist table contains psychologist data, including name, educational background, specialization, and contact information. All of these tables are interconnected, enabling the system to operate in real-time and making the service process faster, more organized, and more transparent.

## Product Backlog

At the initial stage, the research team formulated a Product Backlog, which is a comprehensive and prioritized list of all features, functions, and improvements to be developed in the system. The product backlog items were identified based on field observations and interviews with the Puspaga Harapan DP3AKB staff. The key backlog elements included modules for online registration, consultation form management, queue status tracking, notification systems, psychologist scheduling, and automated psychological report generation. Each item in the backlog was assigned a development priority, estimated duration, and required resources, forming the foundation for subsequent sprint planning.

**Table 1.** Product Backlog

| No. | Backlog Item | Description | Priority | Duration |
|---|---|---|---|---|
| 1 | Online Registration Module | Enables clients to register independently through web or mobile platforms and create secure user accounts. | High | 2 weeks |
| 2 | Consultation Form Management | Allows clients to fill out digital consultation forms, and admins to verify and assign psychologists. | High | 2 weeks |
| 3 | Queue Status Tracking | Provides real-time updates on queue positions, estimated waiting times, and consultation progress. | High | 3 weeks |
| 4 | Notification System | Sends automatic reminders and updates regarding consultation schedules and report status. | Medium | 1 week |

| No. | Backlog Item | Description | Priority | Duration |
|---|---|---|---|---|
| 5 | Psychologist Scheduling System | Manages consultation schedules, assigns clients, and tracks completion status. | Medium | 2 weeks |
| 6 | Automated Psychological Report Generation | Generates structured consultation reports (monthly, quarterly, annual) automatically in PDF format. | High | 3 weeks |
| 7 | Admin Management Dashboard | Centralized dashboard for administrators to manage users, forms, schedules, and reports. | High | 2 weeks |
| 8 | User Authentication & Access Control | Ensures data security and privacy by defining access levels for clients, psychologists, and admins. | High | 1 week |
| 9 | Mobile Application Synchronization | Ensures seamless integration between the web and mobile platforms via API endpoints. | High | 3 weeks |

## Sprint Planning

The Sprint Planning stage served as the foundation for determining the sequence and scope of system development activities. During this phase, the development team, in collaboration with Puspaga Harapan DP3AKB stakeholders, analyzed and prioritized the backlog items according to user needs, technical feasibility, and time constraints.

**Tabel 2.** Sprint Planning

| Sprint | Duration | Sprint Goal / Objective | Backlog Items Implemented | Deliverables |
|---|---|---|---|---|
| Sprint 1 | 2 Weeks | Establish system architecture and core functionality | Online Registration Module, User Authentication & Access Control | Functional user registration system with secure login and authentication; database schema design completed |
| Sprint 2 | 3 Weeks | Develop user-facing modules and administrative workflows | Consultation Form Management, Admin Management Dashboard | Fully functional web form submission and admin dashboard interface for verification and psychologist assignment |
| Sprint 3 | 3 Weeks | Implement real-time service and scheduling components | Queue Status Tracking, Psychologist Scheduling System, Notification System | Real-time queue tracking, consultation schedule visibility, and active notification system |
| Sprint 4 | 3 Weeks | Integrate reporting and synchronization across platforms | Automated Psychological Report Generation, Mobile Application Synchronization | Automatic generation of psychological reports (PDF format), seamless data exchange between web and mobile apps |

## Sprint Execution and Daily Scrum

Developers execute selected items from the sprint backlog according to the priorities established during the planning phase. During the Sprint Execution phase, the development team focuses on translating the planned system components into functional modules through a series of structured technical activities. The first phase involves coding and integration, with the backend developed using the Django framework for the web-based system and Flutter for the mobile app. Both platforms are integrated through RESTful APIs, enabling real-time communication and seamless data exchange between the web and mobile environments. Next, the team configures the database using PostgreSQL. Finally, the team conducts initial functional testing

System Implementation

When using the system for the first time, all users, including patients, administrators, and psychologists, must log in using their registered email address and password. If it does, the login is successful. After successfully logging in, users are directed immediately to the dashboard page corresponding to their role. Figure 3 shows the Client Login and Registration page below.


**Figure 3.** Client Login and Registration Page

After successful registration, clients proceed to the login process and use the system's services. The registration page for psychologists is a dedicated page for Puspaga Psychologists. The Analytics Dashboard page is a display designed explicitly for admins and psychologists to monitor and analyze overall service data. Figure 4 shows the Psychologist account registration page and the Analytics Dashboard.

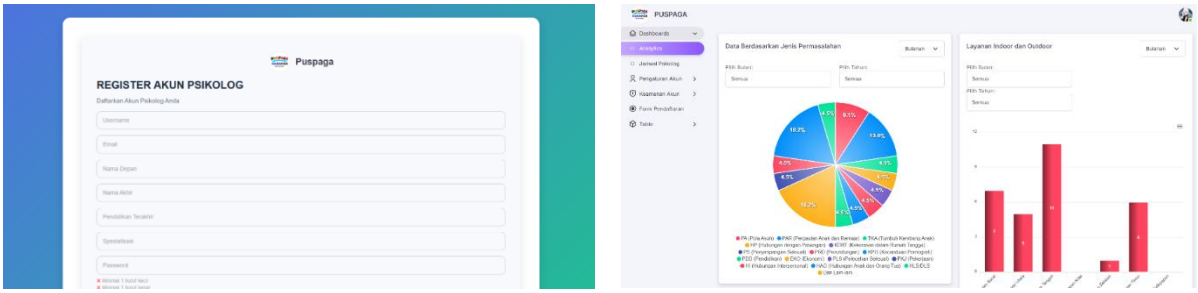


**Figure 4.** Psychologist Account Registration Page and Analytics Dashboard

The Psychologist's Schedule page provides information on consultation sessions scheduled by the psychologist. Each session has a status marked as pending (not yet done) or done (completed), helping psychologists organize and monitor their consultation schedules more efficiently. Figure 5 shows the psychologist's schedule page.

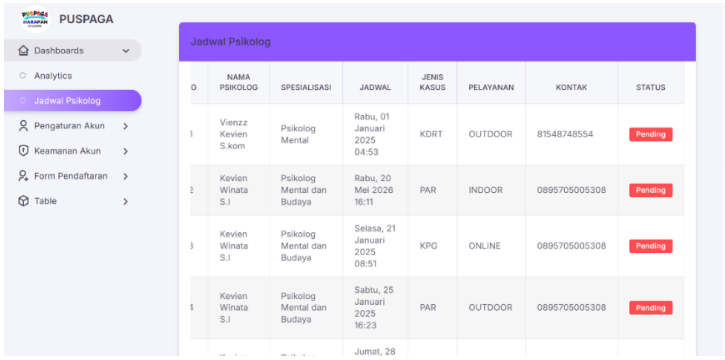


**Figure 5**. Psychologist Schedule Page

The service registration form consists of three main sections that record user information. The first section contains the client's data; the second section records information about parents or guardians; and the third section provides the service consent. Figure 6 shows the registration page for the consultation form.

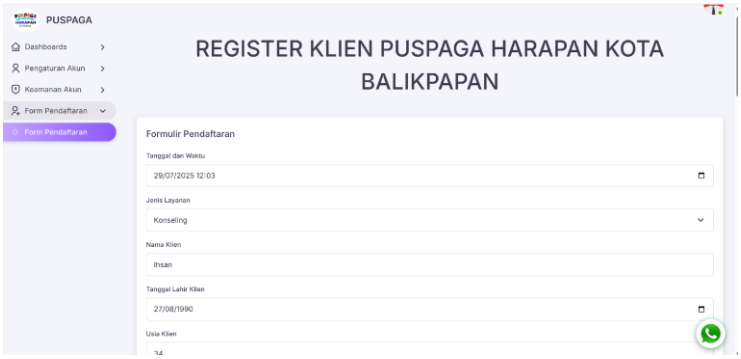


**Figure 6.** Consultation Form Registration Page

The client schedule page is a dedicated view for psychologists, allowing them to view and manage client consultation schedules. Figure 7 shows the client schedule page below.

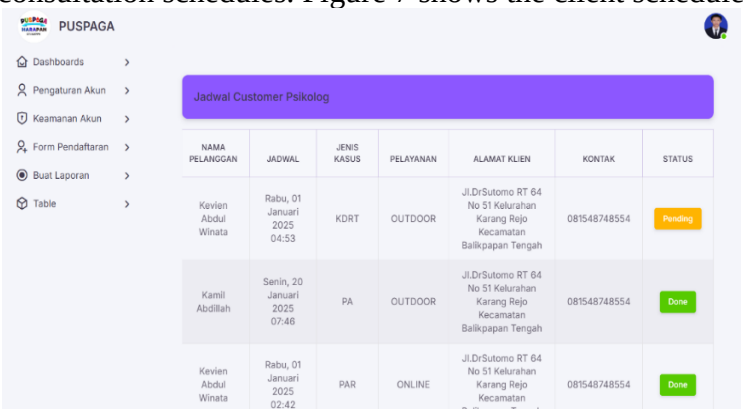


**Figure 7.** Client Schedule List Page

The Management Page is a function intended for admins, which manages all information on forms completed by clients. Admins have full access to rearrange schedules, change service types, etc. Figure 8 shows the Admin Management Page.

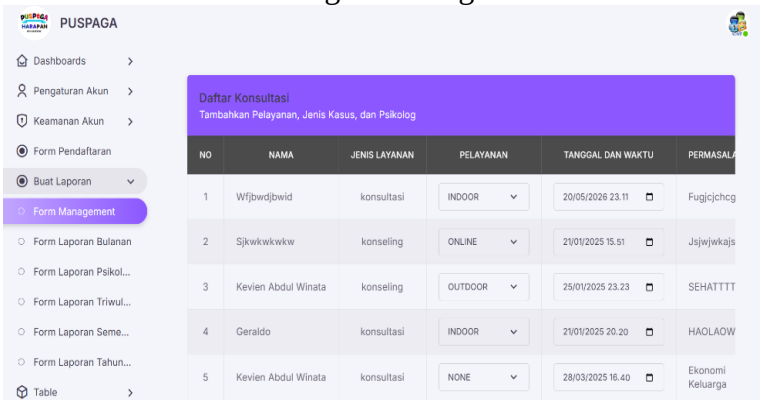


**Figure 8.** Management Admin page

The Print Reports page allows psychologists and administrators to generate routine service reports on a monthly, quarterly, semi-annual, or annual basis. Figure 9 shows the Print Reports page.

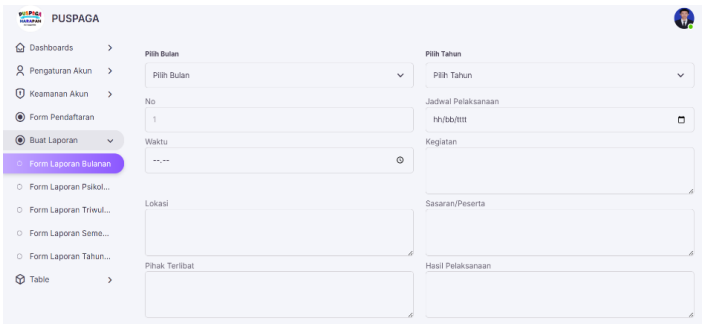


**Figure 9.** Print Report Page

This mobile app's interface is designed using Flutter to ensure a responsive, easy-to-understand, and uniform interface across devices. The app connects directly to the Django API as its backend. Figure 10 illustrates the appearance of the mobile app.

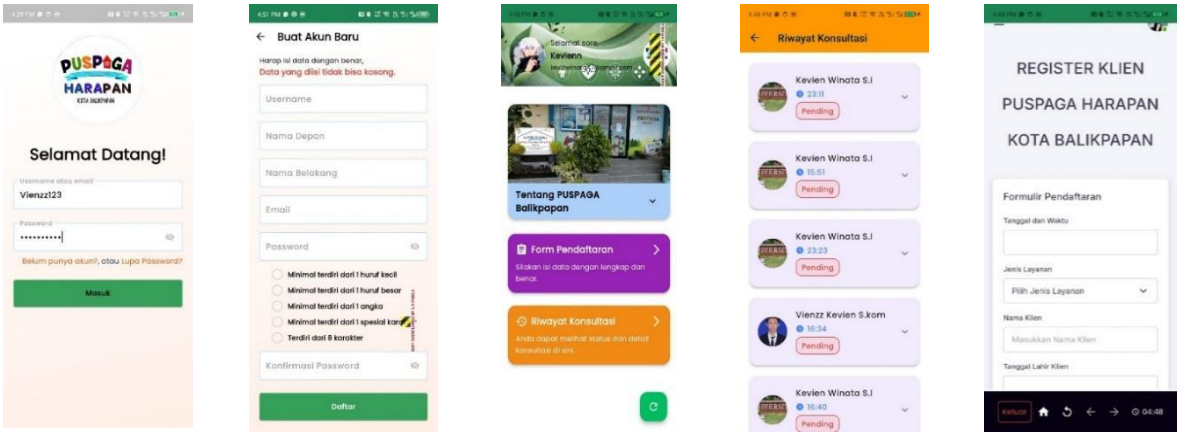


**Figure 10.** Mobile Application Display

## Sprint Review *and* Retrospective

Sprint Review was held with all stakeholders, including the project supervisor and representatives from DP3AKB Puspaga Harapan. During this session, the development team demonstrated the latest functional increment of the system, such as the completion of the online registration module, real-time queue monitoring interface, or automated report generator.

Black Box Testing

This testing uses the black box method, the following is Table 3 of the black box testing of the Puspaga service information system.

**Table 3.** Black Box Testing of Puspaga's Service Information System

| Item | Target User | Input | Expected Output | Test Results |
|---|---|---|---|---|
| Login | Clients, Psychologists and Admin | Login | Enter the Dashboard Page | Valid |
| Register | Clients and Psychologists | Register | Data Stored into Database | Valid |
| Register Counseling Form | Clients | Filling out the form for counseling | Data is saved into the database and confirmed by the admin. | Valid |
| Form Management | Admin | Determine Psychologist, Case Type, and Time for Patient Forms | Data is saved in the database and displayed on the Customer Schedule page. | Valid |
| Customer Schedule | Psychologists | Determining the Status of Counseling that has been carried out | Data is saved in the database and displayed on the Psychologist Schedule page. | Valid |
| Psychologist Schedule | Clients | Accessing a Psychologist's Schedule | View the status of previously completed counseling forms. | Valid |
| Print Report | Psychologists and Admin | Perform data input and print monthly, quarterly, semester and annual reports | Successfully downloaded the inputted report data in PDF format | Valid |

The next step was to test using a Likert scale of 1–5, where 1 indicated "strongly disagree" and 5 indicated "strongly agree." The results of these responses were then analyzed and converted into a feasibility score based on percentage categories. 19 respondents were participating, comprising Puspaga service staff, psychologists, and community members who utilized the service.

The following is a feasibility calculation for one of the questionnaire questions, as shown in the computation below. Question No. 1:

a) Respondents who answered strongly agree (16)
Score T x Pn = 16 x 5
= 80
b) Respondents who answered agree (3)
Score T x Pn = 3 x 4
= 12
Total Score = 80 + 12 = 92
Feasibility Index = 96,84%

For further calculations, they will be presented in tabular form. Table 4 presents the results of the questionnaire testing, conducted using the Likert method.

**Table 4.** Presents the results of the questionnaire testing

| No | Questions | Answer | | | | | Percentage | Category |
|---|---|---|---|---|---|---|---|---|
| | | SS 5 | S 4 | CS 3 | KS 2 | TS 1 | | |
| 1 | Does this website have an attractive appearance? | 16 | 3 | 0 | 0 | 0 | 96.84% | Very Worthy |
| 2 | Are the features on this website easy to understand? | 14 | 5 | 0 | 0 | 0 | 94.74% | Very Worthy |
| 3 | Is this website good enough? | 13 | 6 | 0 | 0 | 0 | 93.68% | Very Worthy |
| 4 | Is the report creation process more effective than before? | 14 | 5 | 0 | 0 | 0 | 94.74% | Very Worthy |
| 5 | Can this website help with work? | 14 | 5 | 0 | 0 | 0 | 94.74% | Very Worthy |
| 6 | Is this website worth developing further? | 15 | 4 | 0 | 0 | 0 | 95.79% | Very Worthy |
| 7 | How attractive is the user login interface for accessing the system? | 13 | 6 | 0 | 0 | 0 | 93.68% | Very Worthy |
| 8 | How effective are the validation features on forms in helping to reduce input errors? | 13 | 6 | 0 | 0 | 0 | 93.68% | Very Worthy |
| 9 | How engaging is the user experience when viewing and printing reports based on real-time data? | 15 | 4 | 0 | 0 | 0 | 95.79% | Very Worthy |
| 10 | How secure and transparent is the web system in managing access rights between clients, psychologists, and admins? | 16 | 3 | 0 | 0 | 0 | 96.84% | Very Worthy |
| 11 | How responsive is the Android app in displaying queue status and consultation schedule in real-time? | 14 | 5 | 0 | 0 | 0 | 94.74% | Very Worthy |
| 12 | How easy is it for users to understand and fill out the consultation service form through the application? | 13 | 6 | 0 | 0 | 0 | 93.68% | Very Worthy |
| 13 | How helpful is the notification feature in reminding you of consultation schedules and service status? | 14 | 5 | 0 | 0 | 0 | 94.74% | Very Worthy |
| 14 | How engaging is the login experience in the Android app, particularly in terms of secure token storage? | 13 | 6 | 0 | 0 | 0 | 93.68% | Very Worthy |
| 15 | How quickly and reliably does the system respond when accessing data from the server, whether via the web or the Android app? | 13 | 6 | 0 | 0 | 0 | 93.68% | Very Worthy |

Based on the test results of the Puspaga service information system, 19 respondents assessed 15 questions via a Likert scale questionnaire, yielding an average percentage of 94.73%, indicating very suitable results. The purpose of this test was to determine the feasibility and user satisfaction with the system that has been implemented, both on the web platform and the Android application. From the test results, most users strongly agree with the attractive design, ease of use of features, fast data access, and effectiveness in supporting service work.

## CONCLUSIONS AND RECOMMENDATIONS

This research developed an integrated psychological services information system for DP3AKB Balikpapan using web (Django) and mobile (Flutter) platforms connected via a RESTful API. Using the Agile (Scrum) approach enabled fast adaptation to user needs. The API ensured real-time data synchronization, reduced redundancy, and improved efficiency. Key features registration, validation, scheduling, and automated reporting worked effectively. Testing showed a 94.73% feasibility rate, indicating high user satisfaction and successful digital transformation support.

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