Journal of Innovative and Creativity
Journal Homepage: https://joecy.org/index.php/joecy
e-mail: journaljoecy@gmail.com

Faculty of Education
University of Pahlawan Tuanku Tambusai
ISSN 2775-771X (Online)
ISSN 2962-570X **(Printed)**
5 (3) 2025, Page: 28221-28228

Design of a Vaccine Registration System to Improve Health Services at the Food, Maritime, and Agriculture Sub-Department of South Jakarta

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Published: Oktober, 2025

ABSTRACT

The development of this web-based vaccine registration system aims to address the challenges of manual and telephone-based registration methods, while enhancing the efficiency and quality of vaccination services at the Food, Maritime, and Agriculture Sub-Department (KPKP) of South Jakarta. By leveraging information technology, this system offers an online registration platform that allows the public to access vaccination services without the need for physical presence. The application features a user-friendly interface, structured data management, and effective vaccination scheduling. The implementation of this system is expected to improve service punctuality, reduce queues, and facilitate data monitoring and management by KPKP staff. The results of the User Acceptance Test (UAT) indicate that all core functionalities operate as intended and are well-received by users, demonstrating the application's capability to deliver a faster, more accurate, and responsive solution for the vaccination registration process, thereby supporting accelerated vaccination efforts in the South Jakarta region.

Keyword : Vaccination Registration, Web Application, Public Service, Information System.

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INTRODUCTION

Health is a fundamental aspect of a population's survival and productivity. In the context of public services, vaccination programs play a crucial role as a preventative measure to control the spread of disease and boost immunity. The effectiveness of vaccination programs impacts not only individuals but also communities, including vital sectors such as food security, maritime affairs, and agriculture, which are highly dependent on the health of human and animal resources.

However, in reality, the implementation of the vaccine registration program at the South Jakarta Maritime Affairs and Fisheries Sub-Department still faces several challenges, including the manual registration process, the accumulation of physical data that is prone to loss or damage, recording errors due to human error, and the difficulty of accurately tracking the vaccination history of certain animals or commodities.

This situation indicates the urgency of improving the vaccine registration system. Without an integrated and efficient system, the potential for uncontrolled disease spread among livestock or agricultural commodities, decreased productivity in the agricultural/marine sectors due to disease, and public dissatisfaction with the quality of public services could increase. Therefore, the design of an information technology-based vaccine registration system is expected to be an innovative solution. Based on the results of trials and user acceptance testing (UAT), all of the system's main functions are functioning as expected and are well-received by individuals, both functionally and face-to-face.

According to Loudan (2020), an information system can be identified as a collection of interconnected components. Meanwhile, according to Zheng (2024), an information system is a

combination of software, hardware, and telecommunications networks utilized to support organizational activities. Based on the results of previous research conducted by Shafira Nurhadizah, Heru Sulistiono, and M Ardiansyah (2023), whose research focused on a manual animal sterilization and vaccination registration system. Meanwhile, A Mulyani, F Nuraeni, A Yuliastri in 2022, the focus of their research was developing a system to support the reporting process of integrated health posts (Posyandu) to community health centers. Therefore, based on the description above, the author chose the research title "***Design of a Vaccine Registration System to Improve Health Services at the Food, Maritime, and Agriculture Sub-Department of South Jakarta***."

RESEARCH METHOD

1. Software Development Methods

The method used in software development is the waterfall model. The waterfall method is a sequential software development process, where progress is viewed as flowing continuously downward (like a waterfall) through the phases of planning, modeling, implementation (construction), and testing.

The waterfall method is still applied in various industries, such as government, defense, healthcare, and finance, where strict regulations and documentation are crucial. In this context, the waterfall approach provides the necessary structure to meet stringent requirements and ensure that all aspects of the project are well documented (Kaspar Consulting, 2025). The stages of software development using the waterfall model are divided into several processes, thats:

a. Requirement
   This analysis aims to formulate the specifications required to develop a web-based vaccination registration application system. This analysis is crucial to ensuring the system is built according to the objectives, personnel needs, and the existing operational environment. This analysis is divided into two parts: functional and non-functional analysis.
   a) Fungsional Requirement
      Functional requirements include user management, vaccination registration, vaccination schedule management, automated queue numbers, registration notifications, and vaccination data reporting.
   b) Non-Fungsional Requirement
      These are specifications that are not directly related to the primary purpose of the system, but are critical to ensuring the quality, performance, and user experience of the system being developed. These include security, availability, usability, performance, and portability.

2. Data Collection Technique

This research uses the following data collection techniques:

a. Observation
   This involves collecting data by observing a number of research objects and facts in the field, allowing for evaluation from specific angles that support the truth. In this case, the author conducted direct research on the development process of a website-based registration application system at KPKP South Jakarta.
b. Interviews
   The author conducted direct interviews with two types of informants: officers and applicants. The officers interviewed were the general public who own pets in the area around the KPKP South Jakarta.
c. Literature Review
   The author collected data by searching for information from archives of the process and results of document creation at the South Jakarta KPKP. The author conducted data collection by studying, researching, and reading literature, including books, journals, theses, and articles related to system development.

3. System Running Procedures

Animal Vaccination Procedures at the South Jakarta Maritime Affairs and Fisheries Sub-Department.

a. Planning and Target Setting
   The South Jakarta Maritime Affairs and Fisheries Sub-Department has set a target for animals to be vaccinated each year. In 2024, 9,500 pets will be targeted for vaccination at the South Jakarta Maritime Affairs and Fisheries Sub-Department. These animals include dogs, cats, monkeys, and civets.
b. Local Coordination
   Local coordination is usually carried out between the Maritime Affairs and Fisheries Sub-Department, the Maritime Affairs and Fisheries Implementation Unit at the sub-district level, and local village and neighborhood unit (RW) officials. This will be held on a rotating basis in each sub-district.
c. Information & Announcements
   Vaccination locations, times, and requirements are announced to residents through the sub-district, local civil servants, social media, and public announcements. This information is usually held every morning between 9 and 12 noon at locations easily accessible to the public, such as village halls, RPTRAs, and sub-district offices.
d. Requirements for Animals That Can Be Vaccinated
   The requirements that must be met for pets to receive vaccinations include:
   a). At least 4 months old
   b). In good health
   c). Not pregnant or breastfeeding
   d). The pet owner must reside in DKI Jakarta
e. Vaccination Implementation
   Next, vaccination officers from the KPKP Sub-dept. or sub-district implementing units will visit the designated location. These locations include the village office, neighborhood association (RW), or other strategic locations easily accessible to the public. The owner will bring the animal to the location, as not all locations offer pet pick-up and drop-off services, depending on the policy in the area. The vaccination will then be administered by a qualified vaccinator.
f. Recording & Documentation
   The final step is to record each vaccinated animal according to the grouping, which includes the number, type of animal, location, owner's identity (if necessary), and neighborhood association (RW) or village. This data can be used for calculating achievement targets, reporting, and evaluation.
g. Additional Control & Rapid Response
   In addition to vaccination, there are measures to control rabies-transmitting animals (HPR) based on public reports. For example, if there are wild animals, sick animals, or animals that bite. This vaccination program will be carried out periodically to prevent the spread of the rabies virus in pets. This service is free for the general public residing in South Jakarta.

4. Database Design
   a. Entity Relationship Diagram

This model is a conceptual model used to describe the logical framework of an information system. The ERD designed aims to digitally model an animal vaccination registration and reporting information system. The following is an explanation of each entity and relationship in the ERD:

Figure 1. Entity Relationshio Diagram

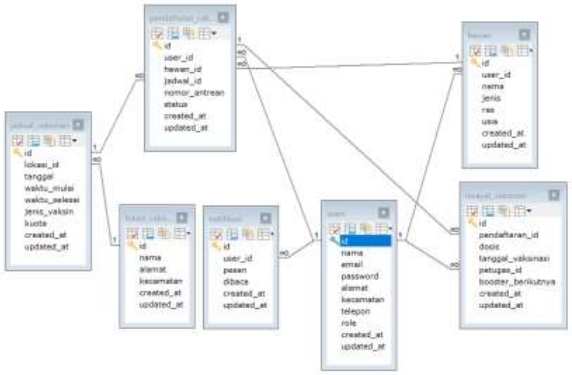


Source : Diagram io, 2025.

b. Logical Record Structure

The animal vaccination information system database is designed using seven main entities: users, animals, vaccination locations, vaccination schedules, vaccination registration, vaccination history. This structure supports the registration flow to complete and integrated vaccination reporting. vaccination, and notification.

Figure 2. Logical Record Structure



Source : Diagram io, 2025.

RESULTS AND DISCUSSION

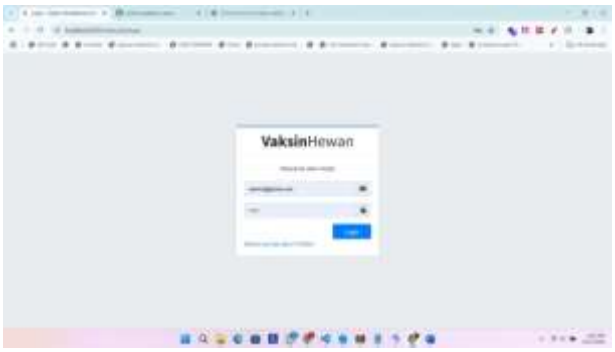
A. User Interface

The following is a design of the user interface for the animal vaccination website at the South Jakarta Maritime Affairs and Fisheries Service (KPKP).

a) Log-In Page

The Login Page is the page used to log in. Before entering the system, you are required to enter your username and password.

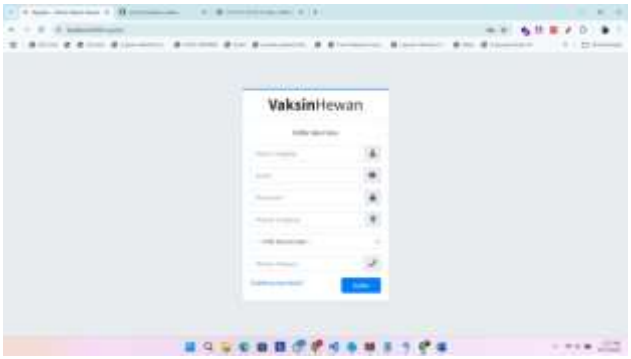
Figure 3. Log-in Page



Source : Author, 2025.

b) Registration Page
The registration page is used if the user does not have an account yet, and they are required to register first.

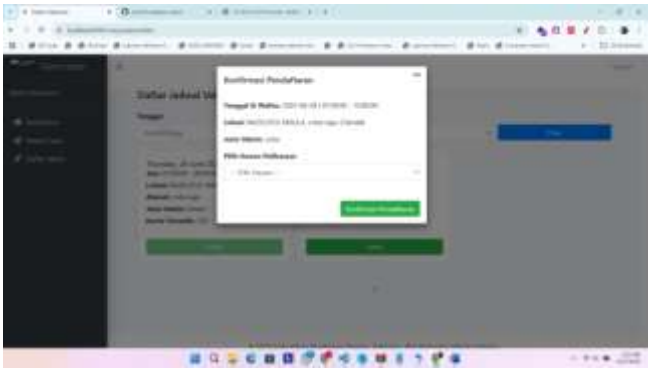
Figure 4. Registration Page



Source : Author, 2025.

c) Admin Dashboard
This page is the admin dashboard, where the admin can view applicant data and manage account management, such as creating officer accounts, updating accounts, activating, deactivating, and deleting accounts. Additionally, the admin can manage application management and news management.

Figure 5. Admin Dashboard

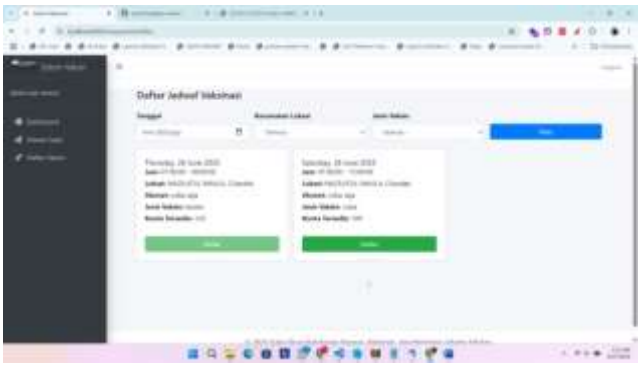


Source: Author, 2025.

d) Vaccine Schedule Page

The Vaccination Schedule page contains information about the timing of animal vaccinations, including the day, date, time and location of the vaccination.

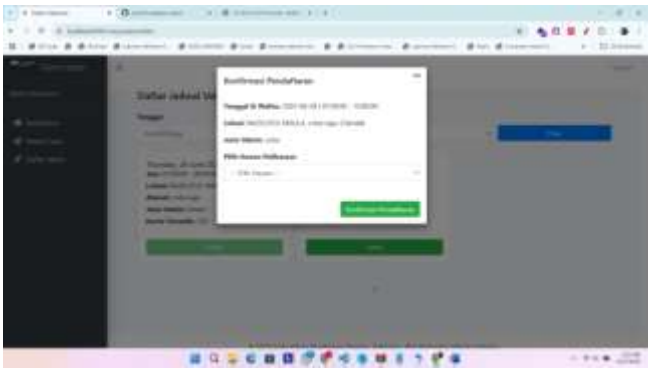
Figure 6. Vaccine Schedule Registration Page



Source : Author, 2025.

e) Confirmation Page

Figure 7. Confirmation of Vaccine Registration



Source : Author, 2025.

B. Testing UAT

Testing was conducted using the UAT method to ensure that the system met procedures and expectations. This testing was the result of collaboration between the three main user roles: Admin, Officer, and Pet Owner. Each user was asked to try out key features and provide feedback on the system's functionality and interface. The following are the test results based on the UAT scenario successfully designed by the researchers.

Table 1. UAT Testing Results

No	Tested Feature	User	Testing Steps	Result	Status
1	Login	All	All users enter a valid email address and password.	Log in successfully according to their role.	□
2	Vaccination Registration	Pet Owner	The owner selects a schedule and animal, then clicks "Register."	Data is saved, and a queue number appears.	□

No	Tested Feature	User	Testing Steps	Result	Status
3	Registration Status	Pet Owner	Open the “Registration Status” menu.	Display the status (pending/served/completed).	□
4	Schedule Management	Admin	Add a new schedule in the Schedule menu.	The schedule is saved and displayed in the table.	□
5	Queue Verification	Officer	Select an active schedule, click "Call," and then "Completed."	The status changes depending on the action.	□
6	View Registrant Detail	Officer	Click "View Details" in the queue list.	Owner and animal details appear.	□
7	Confirm Attendance & Vaccination Completeness	Officer	Click "Mark Present," fill out the vaccination form, then click "Save."	Vaccination data is saved, and the status changes to "Completed."	□
8	Vaccination Location Management	Admin	dd a new location via the form.	Data is saved and appears in the vaccination schedule.	□
9	Logout	All	Click the logout button in the navbar.	Return to the login page.	□

Sourse : Author, 2025.

CONCLUSION

The design and implementation of a web-based animal vaccination registration and verification system at the South Jakarta Maritime Affairs and Fisheries Sub-Department (KPKP) concluded that this system is capable of providing an effective digital solution for the animal vaccination administration process. The system successfully provides an online registration service that allows animal owners to select vaccination schedules and obtain queue numbers without the need for physical presence on site. The digital verification and queue features also facilitate officers in managing the vaccination service flow in real time, which has an impact on reducing physical queues and speeding up the service process in the field. Furthermore, this system also provides features for recording vaccination history and managing attendance status, so that all service activities can be properly documented. Based on the results of trials and user acceptance testing (UAT), all main functions of the system run as expected and are acceptable to personnel both functionally and interface-wise.

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