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Design and Implementation of a Web-Based RT/RW Service Information System and Resident Data Monitoring at Mekarsari Village Environment

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ABSTRACT

This study aims to design and implement a web-based RT/RW service information and resident data monitoring system to improve the effectiveness, accuracy, and transparency of community services. RT/RW administrative services at Mekarsari Village area consist of 28 Neighborhood Associations (RT), 10 Community Associations (RW), and 5,842 residents. Currently, Mekarsari Village still uses a manual services system, which causes several problems such as delays in processing, data recording errors, and difficulties in monitoring resident data collection. The methodology used in this research is the Agile method, which includes an iterative and adaptive process to user needs. Each iteration involves planning, design, implementation, testing, and direct evaluation by users. The technologies used in the design and implementation of this system include the CodeIgniter framework for the backend, MySql as database, and Bootstrap for the user interface. The research data was obtained from direct observation and interviews with village officials, RT/RW, and local residents.

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1. Introduction

Administrative services at the neighborhood association (RT/RW) level are an important component of village governance because they are directly related to the needs of the community, especially at Mekarsari Village. Services such as submitting referral letters, preparing residency documents, and recording resident data are still carried out manually. This service model causes various problems such as delays in processing, potential errors in recording, and a high risk of data loss. These problems are felt by both residents and RT/RW officials, given that most administrators have their main jobs as farmers and traders, so they are not always available when needed to validate or sign documents.

In addition to these obstacles, supporting facilities such as photocopiers located far from residential areas and the lack of a digital queueing system add to the complexity of administrative services. This condition is not only found at Mekarsari Village, but also in various other areas. Studies in several regions describe how manual systems for managing citizen data have resulted in delays in services, errors in recording, and difficulties in tracing archives[1]. The use of spreadsheets as a medium for data management also carries the risk of data loss and is inefficient for the scale of community services that continue to

grow[2]. Other research shows that manual recording in various village and posyandu services hinders the process of reporting and data analysis, thus requiring a web-based system to speed up access to information and improve accuracy[3]. The development of web-based digital services has been proven to improve communication efficiency between citizens and administrative documentation[4].

The implementation of a CodeIgniter-based correspondence service system in several studies has also shown an acceleration of administrative processes and a reduction in the workload of officers, and submissions and validations can be done online[5]. In terms of development methodology, the Agile and Scrum approaches have been used in various studies to design flexible citizen data management systems that are easily adaptable to changing user needs[6]. The Context of RT/RW finances, web-based information systems help improve transparency in recording contributions and financial reports[7][8]. From a governance and reporting perspective, digital-based monitoring systems that display data in real time can support decision-making by village officials and improve accountability[9]. In addition, testing of the quality of RT/RW services systems shows that a simple interface can generate higher user satisfaction levels, making usability an important aspect of digital system design[10]. Web-based systems for managing RT activities, resident data, and contribution reports have also been proven to increase the efficiency and accountability of information delivery[11].

Digital transformation at the village level through the Village Information System (SID) has been proven to accelerate public services and improve administrative processes[12], and training in the use of web-based systems for village officials has had a significant impact on the efficiency of administrative services[13]. These findings show that digitizing RT/RW services is a strategic step to improve services speed, transparency, and data integrity. Therefore, the design and implementation of the RT/RW Service Information System and Web_based Resident Data Monitoring at Mekarsari Village is a relevant solution to overcome existing problems. This system integrates the functions of resident data collection, correspondence services, archiving, reporting, and monitoring into a single, easy-to-use platform. Thus, this system is expected to support transparent, accountable, and technology-based governance at the community level.

2. Research Method

This research methodology uses Agile as the main approach in developing a citizen assistance information system (SIBAWAR). Agile was chosen because of its characteristics that support flexibility, rapid iteration, and active collaboration between the development team and stakeholders(users/citizens, RT/RW, village officials)[14]. In the context of this thesis, Agile implementation was carried out through the Scrum framework, in line with practices widely used in contemporary information system research[15]. The research methodology was designed so that the system development process could run iteratively and incrementally-meaning that the system was built module by module in short cycles (sprints/iterations), and each module was immediately tested and evaluated with users before proceeding to the next iteration[16].

The following is a diagram of the methodology used in my research.

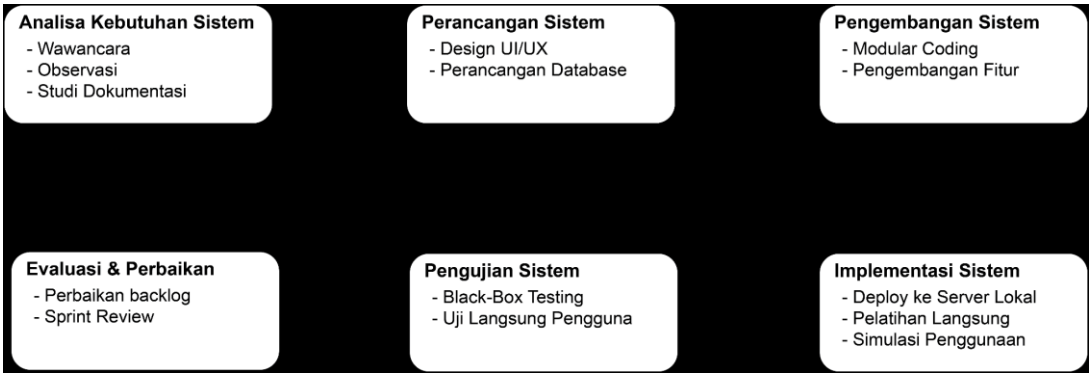

Figure 1. Methodology flow

2.1 System Requirement Analysis

This state began with the collection of requirements through direct interviews on February 18, 2025 at the Mekarsari Village Office and the residences of RT/RW officials. A needs analysis was obstacles encountered, and functional and non-functional requirements that must be met by the system. Requirement

data was obtained through manual letter format documentation, services process observation, and interview results summarized in Table 1. This information was used as the basis for designing core features, including :

Table 1. Results of Interviews with Village Secretaries

No	Interviewer	Sources
1	What is the current process for obtaining a domicile certificate ?	Residents visit their neighborhood association (RT) office, their community association(RW) office, and the village office. The certificate is approved by the RW and submitted to the village.
2	Who is usually involved in the approval process for this certificate ?	The RT, RW, village secretariat, and village head.
3	How long does it take to process a residence certificate	If all parties are present, it takes a maximum of 1 hour.
4	What obstacles do residents often face in the certificate processing process ?	The RT or RW are often not at home because they are working. On average, the majority of RT and RW here are farmers and traders. The village head is also sometimes not in the office.
5	How is the current system for recording and archiving certificates ?	It is still done manually, although it is backed up to Google Drive and the prodeskel application.
6	Are there any difficulties in synchronizing resident data ?	There are difficulties in recording or updating data because the prodeskel website has not been synchronized with the population and civil registration office.
7	Does the village have an online system or website for this service ?	There was a website in 2019, but it was not its own domain, it was only part of the central portal and could not be accessed by residents.
8	What features are needed if a web-based information system is created ?	The creation of referral letters such as ID cards, and certificates can be done online, and signatures can be done via QR code if possible.
9	Is the village apparatus ready to use an information technology-based system ?	The village apparatus, including the village head and neighborhood association leaders, is ready and familiar with the technology, and nearly 80% of the surrounding community understands it.
10	What are the village's expectations for this digital-based system ?	It can speed up services and facilitate access from home.

Based on data table 1. The main system requirements include :

1. Digitization of online document submissions such as ID cards, family cards, certificates, and other submissions.
2. Requires digital signatures to facilitate RT/RW/Sekdes/Kades in minimizing paper usage and speeding up services.
3. Village secretaries need to record or archive data through the system.
4. There needs to be monitoring of residents data to facilitate the search for resident data.

This analysis phase is in line with Agile principles that prioritize understanding user needs through customer collaboration and direct communication[17][18].

2.2 System Design

The design phase is carried out to translate requirements into an implementable system. The design is carried out in two parts :

1. Interface Design (UI Design)
   This was done using Figma in the form of wireframes and mockups to make the system ready to use by residents, RT/RW, and village officials. The design focuses on simplicity and ease of navigation in accordance with user-centered design principles[19].
2. System and Database Design
   The system architecture is designed using UML diagrams through draw.io, while the database is created using MySQL with entities such as resident data, letter data, user

accounts, and service history. The design process follows Agile practices by reviewing the interface at each iteration to ensure it meets user needs.

2.3 System Developments

At this stage, the entire design is converted into a functional application using:

1. Backend: PHP - CodeIgniter 4
2. Frontend: HTML, CSS, JavaScript, Bootstrap
3. Database: MySQL
4. Editor: Visual Studio Code

Development is carried out in a modular manner based on feature priority, including:

1. Module fo submitting cover letters (ID cards, family cards, deeds, and others)
2. Module for managing citizen data
3. Module for monitoring and reporting
4. Module for service history and digital archives.

Each module was developed in short sprints as part of the Agile process, where completed features were immediately tested by users to obtain feedback .

2.4 System Testing

System testing is conducted after each feature is completed. Testing uses the black-box testing method to ensure that the functions work as required, as well as usability testing through direct users (residents, RT/RW, and village secretaries).

Alat uji meliputi :

1. Chrome & Firefox (compatibility testing)
2. Google Meet (system demonstration).

This testing phase adopts the Agile principle, which emphasizes continuous testing and a rapid feedback cycle to maintain system quality.

2.5 Deployment and Iteration

After the system passed testing, implementation was carried out on a limited scale in one neighborhood unit (RT) with a local server installation that could be accessed online. Basic training was provided to users such as neighborhood and community leaders and residents. The implementation phase was followed by iterations, namely continuous improvements based on user feedback. Each iteration cycle resulted in a more stable version of the system that was better suited to the needs of village users, in line with the principle of continuous improvements in the Agile method[20].

3. Result and Discussion

This chapter presents the research results and a comprehensive discussion on the development of a web-based Community Assistance Information System (SIBAWAR) to support RT/RW administrative services in Mekarsari Village. The research results include a description of the case study background, the initial conditions of the manual system in operation, an analysis of problem requirements, an analysis of document requirements, an analysis of problems using the SWOT approach, proposed solutions, proposed business process, system design using UML diagrams, feature implementation, and system testing stages. THe entire discussion is structured into several subsections to facilitate understanding, in accordance with the guidelines for good research writing.

3.1. Case Description and initial conditions

1. Case Study Background

The case study was conducted in Mekarsari Village, where all RT&RW administrative services are still carried out manually, from resident registration to the preparation of documents such as residence certificates and referral letters. The absence of a digital system causes services processes to be hampered when officials are not present, given that the majority of them work as farmers and traders. The impact is that residents have to wait longer, data is often inconsistent, documents are prone to loss or damage[21].

This situation is consistent with the findings of various studies that confirms that villages in Indonesia still face administrative problems due to the lack of digitization of public services[22][23]. Therefore, the need for a web-based information system is becoming increasingly urgent.

2. Initial System Conditions

Before the system intervention, bureaucratic processes in Mekarsari Village were carried out using conventional methods. The business process in the initial system conditions are shown in Figure 1 :

Figure 2. Mekarsari Village Business Process Flow

Based on the explanation of the flow in the figure above, the following conclusions can be drawn:

1. Applications are submitted by visiting the RT/RW office.
2. Records are made in a notebook or printed form.
3. There is no centralized population database.
4. There is no queuing mechanism or services status monitoring.
5. Communication is only conducted informally via WhatsApp.

Based on these conditions, services are slow, prone to document loss, and inefficient. This condition is also found in many villages in Indonesia that have not implemented basic e-government.

3.2. Needs and Issues Analysis (SWOT Method)

Based on the initial conditions and the results of interviews with village officials and residents, the research used SWOT analysis to formulate system requirements. The following is a summary of the analysis in Table 2 :

Table 2. Needs and Issues Analysis Using the SWOT Method

Strengths	Weakness	Opportunities	Threats
There is awareness among village officials and residents of the importance of digitizing services. Some residents and officials already familiar with bais technology	There is no centralized system/ residents database data is scattered and inconsistent. Archives are still manual-prone to loss, damage, or difficulty in retrieval. The validation and service processes are highly dependent	The trend of digitalization of village administration in Indonesia is increasingly supportive, with many villages starting to implement information systems that can improve administrative efficiency and transparency. Advances in digital infrastructure	The level of digital literacy among officials and residents can be an obstacle-not everyone is comfortable or capable of using digital systems. Network infrastructure (internet) in some areas may be

	on the availability of officials.	(internet access, mobile devices) enable residents to access services online.	inadequate-this is also often cited as a major obstacle to digitization in villages.

Based on this SWOT analysis, the main requirements that emerged were a web-based information system that enables online letter submission, a centralized resident database, digital archives, flexible Validation, and service monitoring all of which address weaknesses and capitalize on existing opportunities.

3.2. Proposed Solution

Based on the results of the analysis of needs, problems, and evaluation of administrative service processes at the RT/RW level, the researcher proposes the development of the Design and Implementation of an RT/RW Service Information System and Web-Based Resident Data Monitoring in TH VIllage Environment or in short the SIBAWAR (Resident Assistance System) website as a digital solution that can replace the manual processes that have been in place. This system is designed to provide integrated, fast, transparent, and accessible web-based administrative services for all stakeholders in Mekarsari Village.

3.3. Proposed SBusiness Solution

The proposed business process in the Community Assistance Information System (SIBAWAR) was developed to improve the flow of RT/RW administrative services, which were previously carried out manually. This proposed business process is designed so that every actor-form residents to village officials can carry out their duties digitally, in a structured manner, and integrated into a single web-based village service platform.

Figure 3. Business Proposal Process in Progress

After that, the general process flow is as follows. Residents can view public information without logging in, while after logging in they can update their profiles, submit requests for letters, and monitor the status of their submissions. RT receives notifications of new submissions, performs initial verification, monitoring RT statistical data, and forward requests to RW or the Village Secretaries. RW continue verification at the sub-district level, manage announcements to all RT in their area, and monitor residents reports and statistics. The Village Secretaries manages application summaries, drafts official village letters, processes documents requiring the Village Head's signature, and monitors village apparatus activities. The Village Head reviews overall application reports and provides final approval for verified letters. Meanwhile, the Admin focuses on system management, from user management, master data, access rights settings, to monitoring system activities and security.

With this proposed business process, each actor has a clear and interconnected role to support faster, more transparents, and more efficient village administration services. This flow also forms the basis for the implementation of features and system design diagrams in the next stage.

3.4. System Design (Use Case Diagram & Activity Diagram)

This system design in this study uses two main models, namely Use case Diagram and Activity Diagram, which are part of the Unified Modeling Language (UML). UML was chosen because it provides a systematic modeling standard that is easy for stakeholders to understand and is commonly used in the development of government information systems and public services. Recent studies confirm that UML is effective for visualizing requirements, reducing ambiguity, and improving design quality prior to technical implementation.

1. Use Case

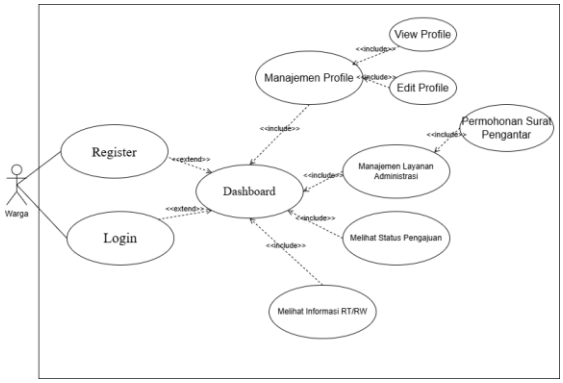

Figure 4. Citizen Use Case Diagram

The use case diagram above illustrates the interaction between residents and the Resident Assistance Information System (SIBAWAR) in the context of web-based administrative services. Citizens act as the main users who interact directly with the system to access various RT/RW and village administrative services. In the initial stage, citizens can register or log in to enter the system. After successfully logging in, citizens are directed to the dashboard, which serves as the access center for all services features.

Through the dashboard, residents can perform several key functions, including profile management, which covers viewing and updating personal information, administrative services management, namely submitting cover letters for residency requirements, viewing application status to monitor the progress of administrative processes, and accessing RT/RW information as a source of information related to activities, announcements, and environmental data. This use case modeling provides a clear picture of the functional requirements of the system from the user's perspective. In addition, this diagram helps visualize the relationships between processes, supports interface design, and ensures that digital service mechanisms are aligned with residents needs and established administrative service flows.

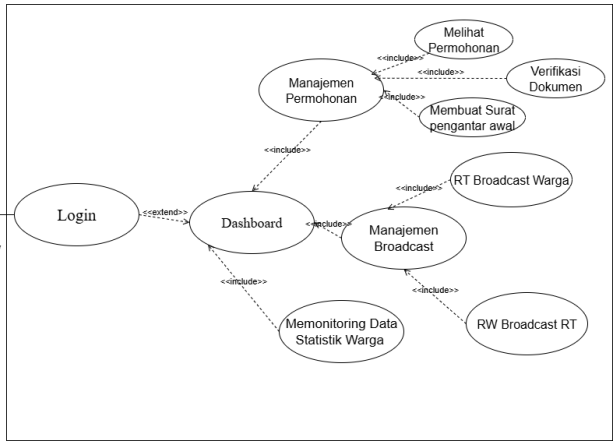

Figure 5. RT/RW Use Case Diagram

The use case diagram above illustrates the interaction between RT & RW actors and the Community Assistance Information System (SIBAWAR) in the context of web-based administrative services management. The RT & RW actors act as managers of residents administrative data and decision makers for the ongoing services process. In the initial stage, the RT & RW need to log in to enter the system and gain

access to the management features. After successfully logging in, users are directed to the dashboard, which functions as a control center, providing a summary of information and quick access to all operational features.

Through the dashboard, RT & RW can perform several key functions, such as request management, which includes viewing residents requests, verifying submitted documents, and creating cover letters as the initial stage of the administrative process. In addition, there is also a broadcast management feature, which allows RT & RW to convey important information to residents or other RT heads quickly and in a structured manner. RT & RW can also access the residents statistics monitoring feature, which displays demographic data and population conditions within their respective areas.

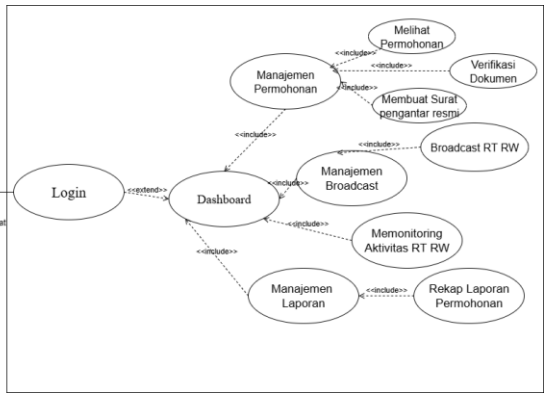

Figure 6. Secretaries Use Case Diagram

The use case diagram above illustrates the interaction between the Village secretary actor and the Community Assistance Information System (SIBAWAR) as a digital-oriented village administration support system. The Village Secretary is an important actor tasked with managing the verification process, issuing letters, and supervising RT/RW activities in the process of providing administrative services to the community.

After logging in, the Village Secretary is directed to the dashboard, which is the access center for all management features, which includes viewing residents applications, verifying documents, and issuing official cover letters after the verification process has been declared valid. In addition, there is a broadcast management feature, which allows the Village Secretary to disseminate information to RT and RW through the RT/RW broadcast module. The Village Secretary also has access to the RT/RW activity monitoring module, which is used to monitor administrative processes carried out by regional officials. Finally, the Village Secretary can access the report management module, which includes a report recap feature to support the preparation of periodic reports to the Village Head.

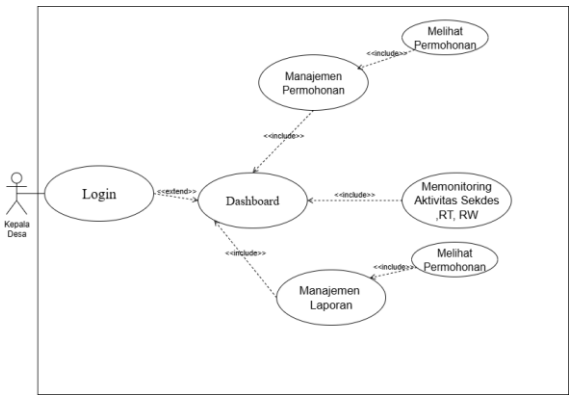

Figure 7. The Village Head Use Case Diagram

The use case diagram above illustrates the interaction between the Village Head and the Community Assistance Information System (SIBAWAR) as a digital platform that supports the management of administrative services and the monitoring of the village officials performance. The Village Head acts as a strategic actor with high-level access rights to monitor, evaluate, and ensure that administrative services are carried out in accordance with regulations.

After logging in, the Village Head is directed to the dashboard, which serves as the control center for all operational activities. Through this dashboard, the Village Head can access several key functions, such as request management to view submissions from residents or RT/RW officials a feature to view requests as a form of administrative progress monitoring and a module for monitoring the activities of the Village Secretary, RT, and RW to find out the workflow, document verification performance, and the status of ongoing services. The Village Head can also access the report management feature, which provides a summary and recapitulation of administrative requests for a specific period.

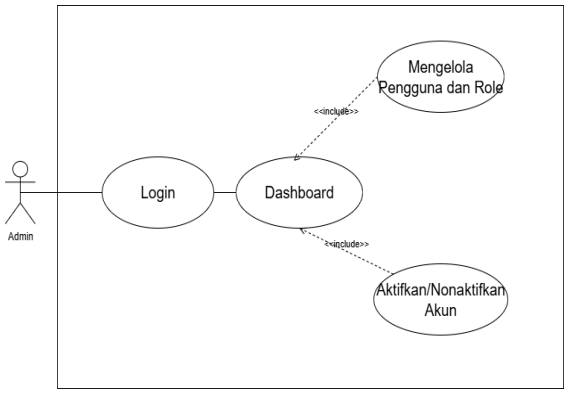

Figure 8. Admin Use Case Diagram

The use case diagram above illustrates the interaction between the Admin actor and the system, which focuses on user access management and full control over account activities in the application. The Admin acts as the main actor with the highest authority in ensuring the security, order, and smooth operation of the system. The process begins when the Admin logs into the system to access the available functionality. After successfully logging in, the Admin will be directed to the dashboard, which serves as a control center where all administrative activities can be monitored and managed. This dashboard is not only the main display after authentication, but also a link to various important features directly related to user management.

Through the dashboard, Admin can access the Manage Users and Roles feature, which is marked as included because it is an integral part of the dashboard main functions. With these features, the admin has the authority to add new users, set up role structures based on organizational needs, and adjust each user's access rights to align with their responsibilities. This feature is key to building secure and structured access management. In addition, the dashboard also includes an Enable/Dibale Account function, which allows Admin to manage user status directly. This process is also an integral part of the dashboard, as it is a routine task in maintaining system security, such as disabling accounts that are no longer in use or found to be in violation, and reactivating accounts when necessary.

2. Activity Diagram

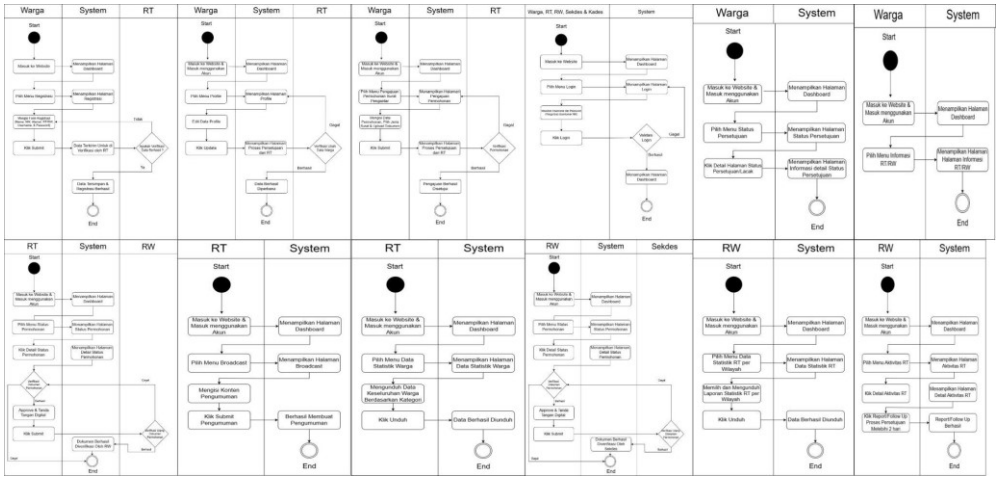

Figure 9. Activity diagram of residents, RT, RW, village secretary, village head, admin 1

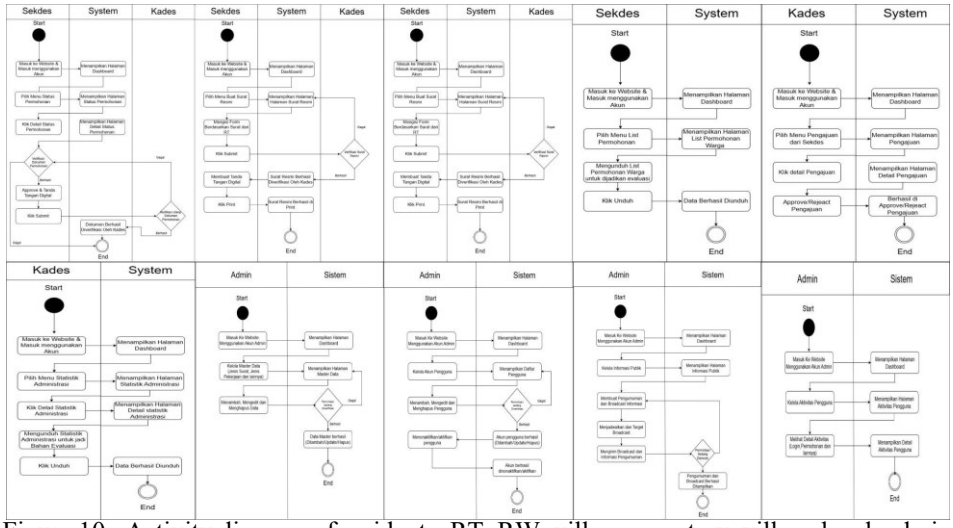

Figure 10. Activity diagram of residents, RT, RW, village secretary, village head, admin 2

The activity diagrams in Figures 1 and 2 illustrate the entire service process flow in the Community Assistance Information System (SIBAWAR), which involve all actors, form residents, neighborhood associations (RT), community associations (RW), village secretaries (Sekdes), village heads (Kades), to administrators. These diagrams show how each actor performs their role in supporting the village administration process in a digital, structured, and interconnected manner.

In Figure 1, the flow begins with residents accessing the system to register, log in, update their profiles, or submit requests for letters. Each request submitted by residents will enter an initial verification stage by the RT. If the data is declared valid, the system continues to the next stage, such as approval, document printing, or information distribution. Other interactions such as checking approval status, accessing RT/RW information, creating announcements by the RT, and downloading resident statistical data are also shown in the first diagram, illustrating the functions of daily operational services.

Next, Figure 2 shows the advanced process flow involving the Village Secretary, Village Head, and Administrator. The VIllage Secretary receives files from the RT for further checking before forwarding them to the Village Head for final approval and digital signing. Once approved, the document can be printed or downloaded by residents. At the same time, the Village Head also has other activities such as viewing the list of applications, reviewing administrative statistics reports, and making decisions on submissions from the Village Secretary. Meanwhile, the Administrator performs system management functions, including master data management functions, including master data management, user account settings, public information management, and monitoring the activities of all users within the system.

3. Class Diagram

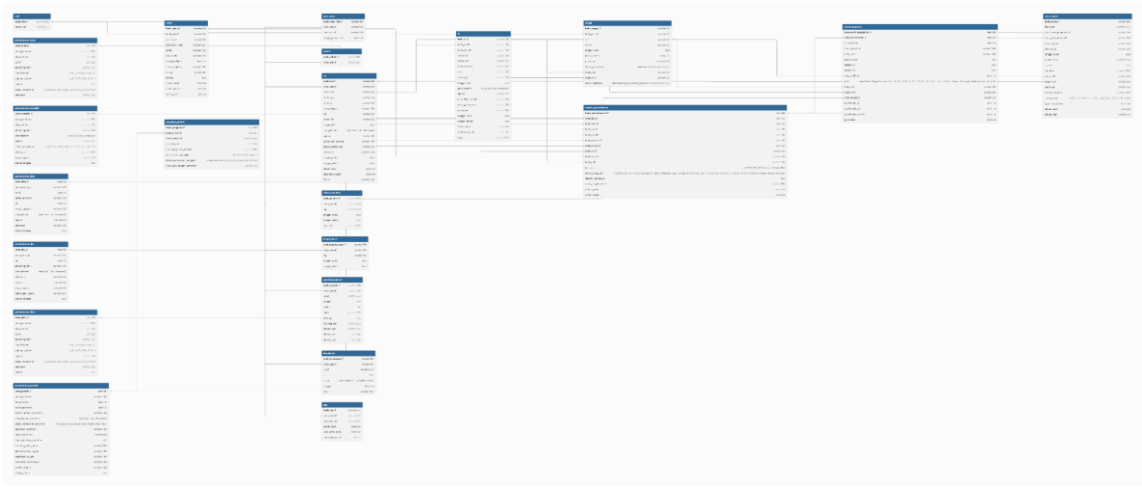

Figure 11. Class Diagram SIBAWAR

Figure 10 shows a class diagram of the SIBAWAR system illustrating the main data structure used to manage citizen administration services digitally. This diagram shows how important entities are connected to support the process of citizen registration, document submission, tiered verification, and the issuance of official documents by village officials. Essentially, the system centers on user entities, which store information on all user accounts, including residents, neighborhood associations, village secretaries, village heads, and administrators. Each user has a specific role that is managed through the role entity and the users_role connection table, so that access rights can be determined flexibly and structurally. Complete identity information for residents or village officials is represented in derivative entities such as residents, RT, RW, village sectaries, and village heads, each with detailed attributes such as personal data, work area, and digital signatures.

The most important part of the class diagram is the structure of administrative service requests. The system separates each type of request into specific classes such as permohonan_ektp,permohonan_domisili, permohonan_skm, permohonan_sku, permohonan_skck, and permohonan_pindah so that each type of letter has attributes that suit the data requirements of each. All of these requests are combined in the master_permohonan entity, which functions as control center and determines the process status, submission time, document type, and relationship with the village apparatus handling it. At the processing stage, the class diagram shows two main types of documents surat_pengantar, which is created and verified in stages by RT, RW, and village secretary and surat_resmi, which becomes the final documents after being signed by the village head. The close relationship between these two entities ensures that the process(tracking) from the initial submission to the final document can be traced transparently.

The system is also equipped with supporting entities such as broadcast for sending information to residents, agenda_kegiatan for recording village activities, and otp used for account verification through security code. Each of these entities remains connected to users so that the entire process has strong data integrity and security.

4. Implementation

a. Application Home Page (Login)

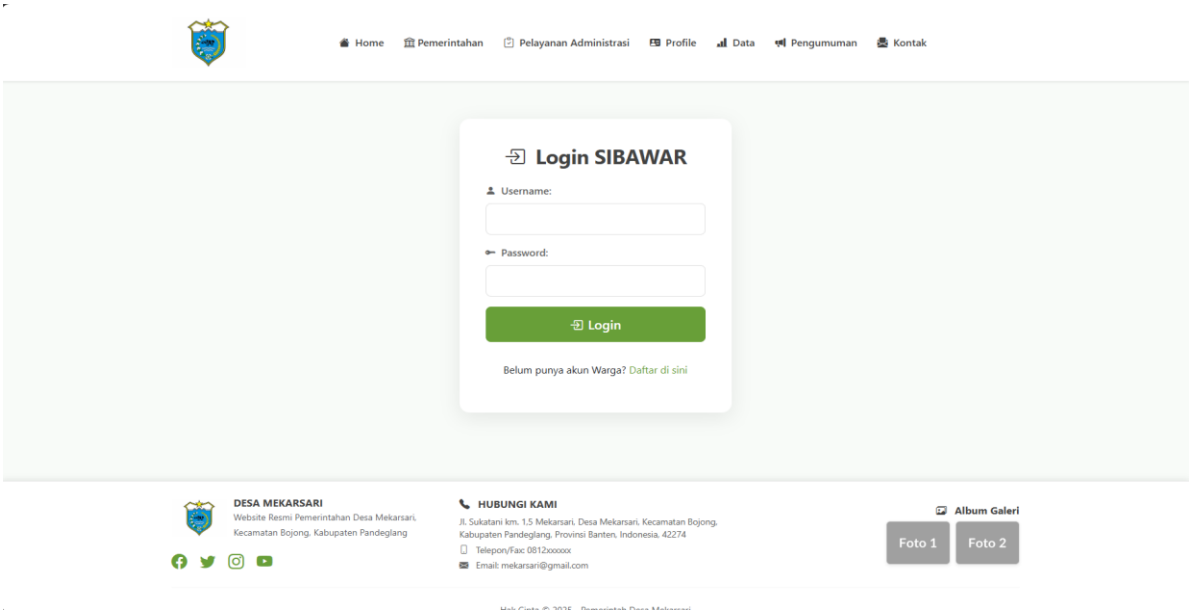

Figure 12. Login Page

The login page serves as the main authentication gateway for residents and village officials to access digital administrative services. Through this page, users enter their username and password to be verified before being directed to the dashboard according to their respective roles. The simple and centralized display makes it easy for users to log in to the system, while a registration link is provided so that residents who do not yet have an account can create a new one. Overall, the login page ensures secure access and serves as a control mechanism so that each service can only be used by registered and verified users.

b. Application Register Page

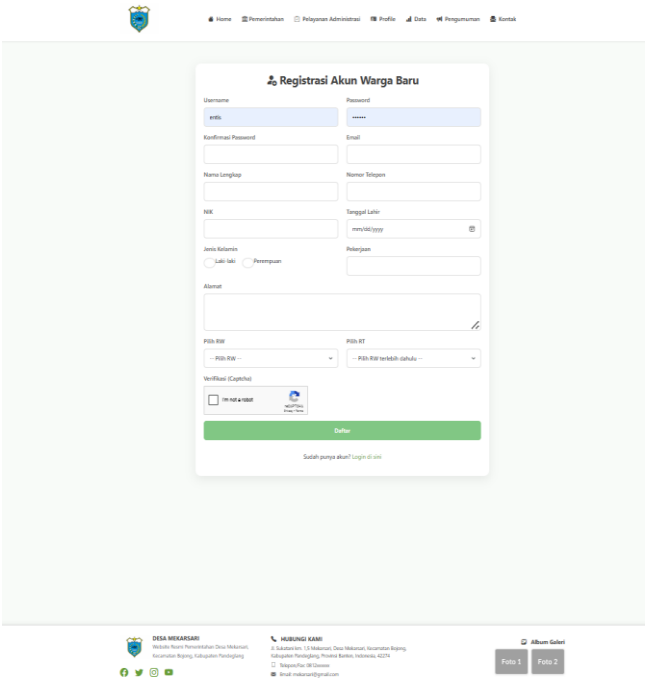

Figure 13. Register Page

The resident account registration page on the system is used as a means of registration for residents who wish to access village administrative services digitally. On this page, residents are asked to fill in basic identity information such as username, password, email, telephone number, NIKI, address, and select there is a captcha verification to ensure that the registration process is carried out by valid users and to prevent automated activity. After all data has been filled in correctly, users can press the "Register" button to create a new account. This page ensures that only registered and verified residents can use administrative services in the system.

c. Application VerifyOTP Page

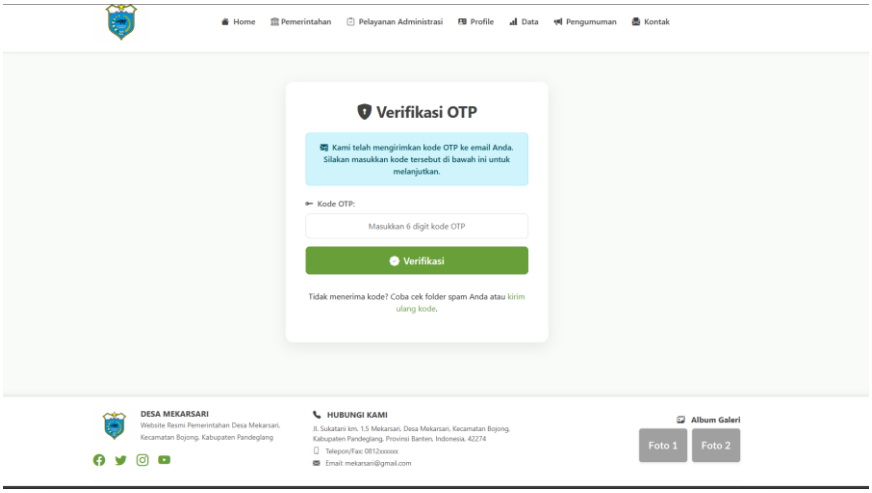

Figure 14. Verify OTP Page

The OTP verification page on the system serves to ensure that the resident account register process is carried out by the legitimate email owner. After the user completes the registration form, the system will send an OTP (One-Time-Password) code to the registered email address. On this page, users are asked to

enter the OTP code as a security validation step. Once the code is verified as correct, the system will mark the email as verified and automatically redirect the user to the login page.

d. Application Dashboard Page (Warga, RT, RW, Sekretaris Desa, Kepala Desa & Admin)

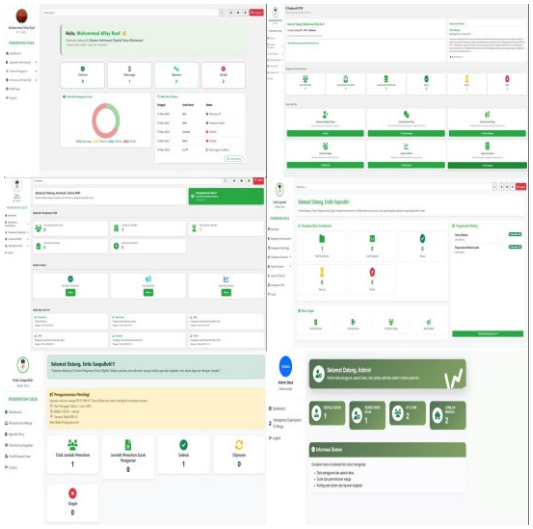

Figure 15. Dashboard Page Warga, RT, RW, Secretary, Village Head, Administrator

The Mekarsari Village Digital Information System has several dashboard panels tailored to the roles of users, namely residents, RT, RW, Village Secretaries, Village Head, and Admin. The residents Dashboard Citizen focuses on summarizing letter submissions, displaying statistics such as 1 letter with "Pending" status and 2 letters with "Rejected" status, and presenting "Latest activities" submissions such as E-KTP that are "Pending Verification". Next, the RTdashboard serves as a control center for monitoring residents request, viewing service statistics, and managing neighborhood data and information. Through quick access, RT can approve registrations, review submissions, manage public information, and view activity reports. Next the RW dashboard displays statistics for their area, including "Total Residents" (2) and provides a "Quick Access"" menu for request verification actions. Meanwhile the Village Secretary Dashboard highlights the "Summary of Application Status" that needs to be processed, showing 1 recorded application, and provides shortcuts for administrative tasks such as "Create Official Letter". Finally, the Village Administrator Dashboard serves as a central control panel, providing important statistics on village personnel, such as 1 village head, 1 Village Secretary, RT & RW, and a total of 2 residents, as well as providing guidance on managing personnel data, letters, and system configurations.

e. Application administrative services page

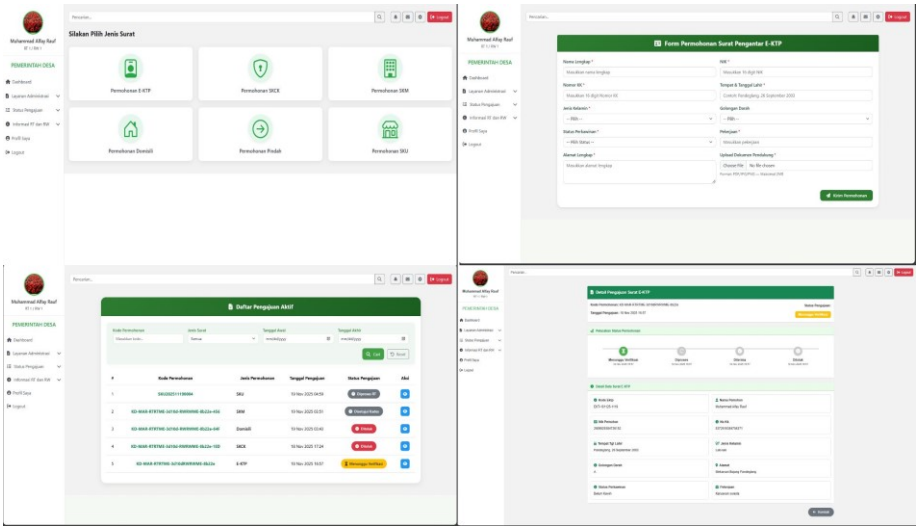

Figure 16. letter service page, sample letter forms, list of submissions, and submission details

Continue to the Services page, where citizens submit requests for various types of documents according to their needs. The process begins with the "Please Select Document Type" , which serves as the main menu for applicants to select the type of letter they need, such as an E-KTP application, SKCK, SKM, Domicile, Transfer or SKU. After selecting, application Form, which is used to collect complete personal data (name, NIK, KK, place/date of birth, gender, blood type, marital status, occupation, address) and uploading supporting documents to submit the applicants can monitor the status of their application through the "application status" section, which displays the "list of active applications which serves to show a summary of the submissions that have been made, including the application code, application type, date of submission, and submission status ('Processed by RT', 'Approved by Head of Section', 'Rejected', or 'Awaiting Verification'). Finally, "E-KTP Application Details" provides more detailed information about a specific application, including applicant details, the verification process undergone ('Awaiting Verification', 'Being Processed', 'Approved', 'Rejected'), and the current status of the application.

f. pplicationAppearance of cover letters and official letters page

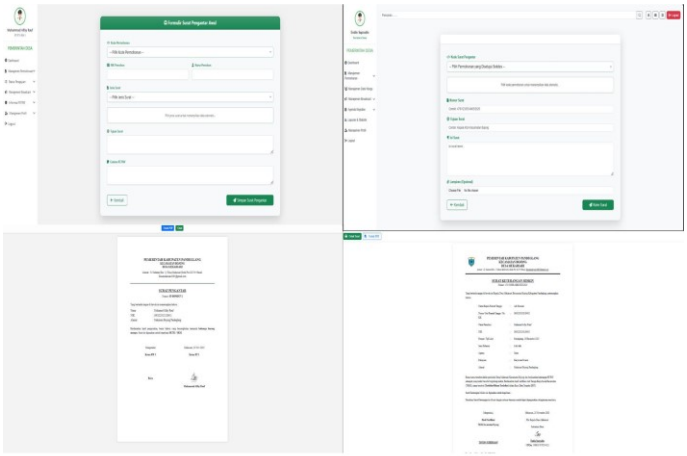

Figure 17. initial cover letter form, official letter, initial cover letter and official letter display

The First image shows the initial cover letter form used by the RT to process residents administrative requests before they are verified by the RW. Once the data is complete the Village Secretary, as shown in the second image, drafts an official letter based on the cover letter, which is then forwarded to the Village Head for final approval. The third image shows the results or preview of the initial cover letter created by the RT, while the fourth image is an example of an official letter prepared by the Village Secretary as a final valid document for residents administrative needs.

g. ApplicationBroadcast list and RT/RW list page

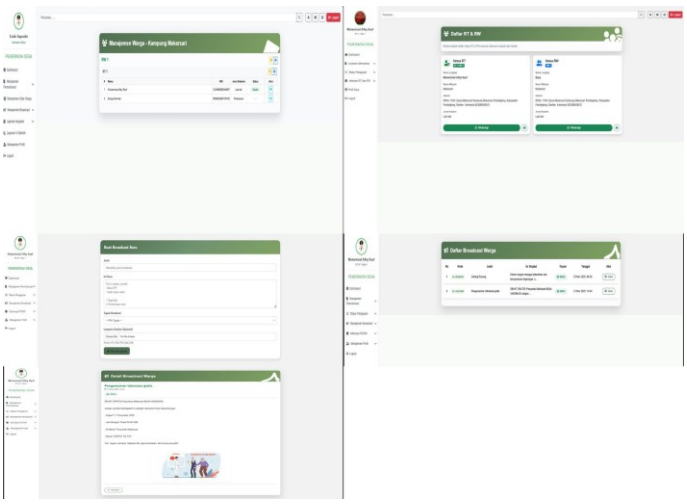

Figure 18. Broadcast page, RT&RW list, and resident data management

The First image shows the residents data management feature, which can only be accessed by the Village Secretary to view information on neighborhood associations (RT), community associations (RW), and residents based on the village, thereby facilitating the management of population data in the village. The second image shows a list of RT and RW that can be viewed by residents and village officials, containing contact information, location, and brief identities as a means of communication and coordination. The thor image shows the broadcast creation form used by RT, RW, and the Village Secretary to disseminate important information to residents. The fourth image is a list of broadcast messages that can be accessed by all user roles, where the Village Head acts as a monitor of the information disseminated. Finally, the fifth image displays the complete details of the broadcast message, containing the information conveyed to the village community.

h. Application Activity Agenda and Monitoring page

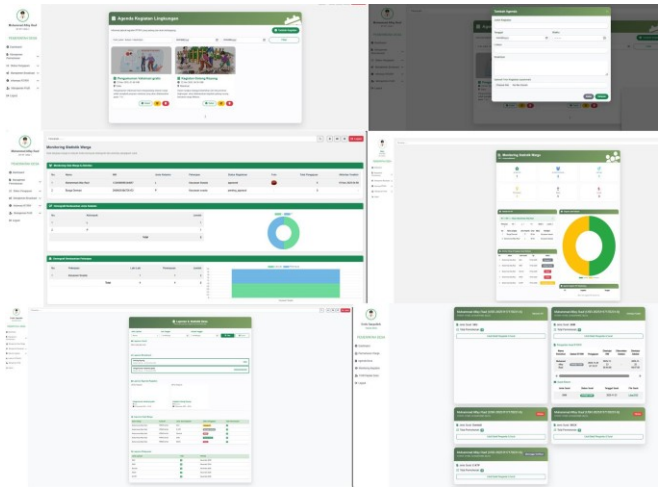

Figure 19. Activity Agenda and Data Monitoring Page

The first and second images show the village activity agenda feature, which can be accessed by the entire community and village officials to view information on environmental activities, while the agenda addition form can only be used by RT, RW, and the Village Secretary to create, edit, or delete agendas, while residents can only view them. The next image shows the resident statistics monitoring module and different administrative activities according to the user's role. RT monitors their residents by area, RW view cross RT summaries, Village Secretary oversee all population and application data, while the VIllage Head obtains a comprehensive village level monitoring display. This feature serves to ensure transparency, coordination, and supervision of administration and community activities to run effectively and measurably.

i. Application Profile page

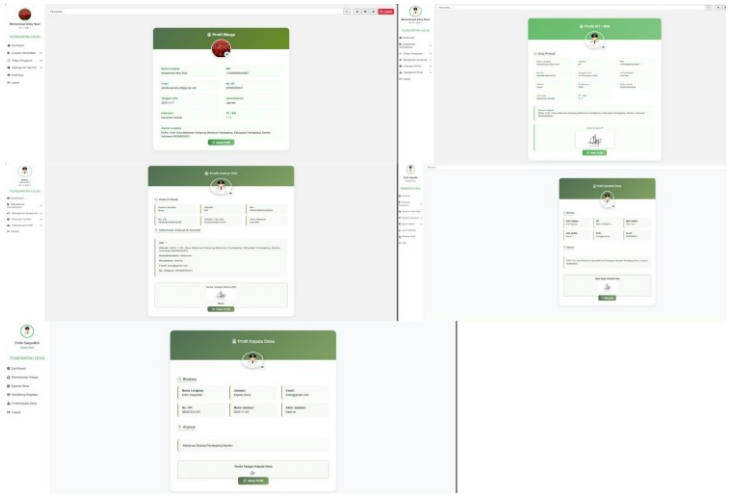

Figure 20. Profile Page

The pages in this image display user profile features tailored to each role, ranging from residents, neighborhood association leaders, community association leaders, village secretaries, to village heads. Each profile displays biographical information, contact details, address, and relevant job attributes, including digital signatures for village officials who need to authorize documents. Residents can only view and update some of their personal data, while village officials have additional access to manage job information and verify documents. This feature ensures that each user's identity is clearly recorded, improves data accuracy, and supports a structured and accountable village administration process.

j. Application Manage village officials and residents page

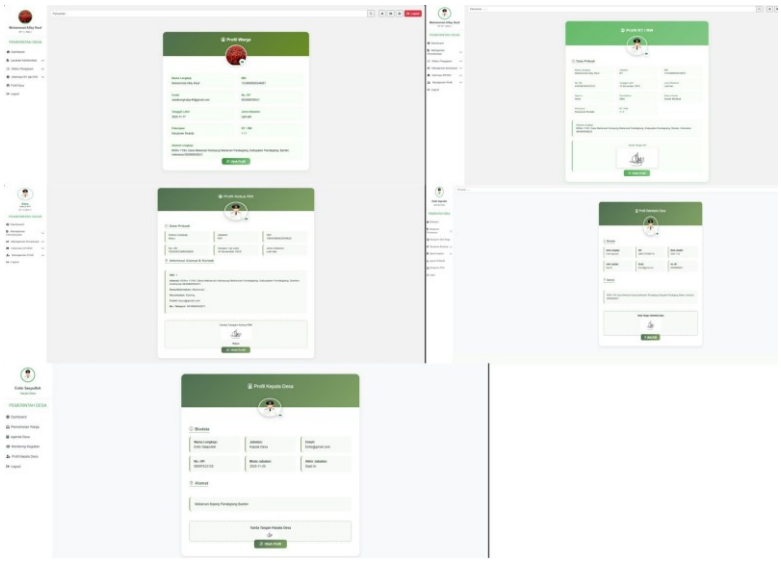

Figure 21. Management Page Manage Officials and Residents

The first image shows the village admin page used to manage all village officials and residents, including account settings, user roles, activity status, and the addition of new officials. This feature ensures that the village organizational structure is neatly recorded and controlled. Meanwhile, the second image shows the RT page, which is used to verify new resident registration requests according to their RT/RW domicile. Through this page, the RT can review the data of residents who have registered and give their approval or rejection as an initial step in validating identities in the system.

4. Conclusion

The research successfully achieved the objectives described in the Introduction, namely to design and implement a faster, and integrated web based RT/RW administration service system. The SIBAWAR system is able to overcome manual process problems such as delays, recording errors, and verification difficulties. The results of the development show an improvement in services and ease of monitoring population data. In the future, this system can still be developed through the integration of electronic signatures, synchronization of population data, and the development of mobile applications.

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