A Web-based Village Administrative Information Systems fo Improvement Quality of Service towards Smart Village Concept

Kenrick Filbert Siman[1], Jansen Wiratama[2]✉

[1,2] Information Systems, Faculty of Engineering and Informatics, Universitas Multimedia Nusantara, Indonesia

Informasi Artikel	ABSTRAK
	Pelayanan administrasi publik adalah hal yang wajib disediakan oleh pemerintah untuk warganya. Ketersediaan perangkat teknologi yang mendukung pelayanan desa sudah tersedia dan dapat digunakan, namun pada realisasi kegiatannya sampai saat ini masih terdapat banyak desa belum optimal dalam memberikan pelayanan karena masih menggunakan metode konvensional. Penelitian ini dilakukan pada Desa Cihuni yang memiliki populasi penduduk lebih dari 7000 orang. Penerapan metode pelayanan secara konvensional tidak dapat berjalan optimal dengan jumlah populasi penduduk yang banyak. Oleh karena itu, diperlukan sebuah sistem informasi yang dapat membantu petugas desa dalam melakukan pengelolaan administrasi warganya. Sistem Informasi Administrasi Desa dirancang dengan metode *System Development Life Cycle* (SDLC) menggunakan model *Rapid Application Development* (RAD). Pada tahap perancangannya, *Framework* Bootstrap digunakan sebagai *front-end* dan *Framework* Laravel digunakan sebagai back-end Sistem Informasi Administrasi Desa berbasis web. Penelitian ini menghasilkan Sistem Informasi berbasis website untuk desa Cihuni dan telah diuji menggunakan metode *User Acceptance Test* (UAT) dengan hasil yang sesuai dengan kebutuhan desa Cihuni.
	ABSTRACT *Public administration services are things that the government must provide to its citizens. The availability of technological devices that support village services is available. It can be used, but in the realization of activities to date, many villages could still be more optimal in providing services because they still use conventional methods. This research was conducted in Cihuni Village, which has a population of more than 7000 people. Conventional service methods cannot work optimally with a large population. Therefore, an information system is needed to assist village officials in managing the administration of their residents. The Village Administration Information System was designed using the System Development Life Cycle (SDLC) method using the Rapid Application Development (RAD) model. At the design stage, the Bootstrap Framework was used as the front end, and the Laravel Framework was used as the back end for the web-based Village Administration Information System. This research produces a website-based Information System for Cihuni village. It has been tested using the User Acceptance Test (UAT) method with results that meet the needs of Cihuni village.*

***Corresponding Author*:**
Jansen Wiratama
Information Systems, Faculty of Engineering and Informatics, Universitas Multimedia Nusantara.
Scientia Garden Jl. Boulevard Gading Serpong, Kab. Tangerang-Banten, 15810.
Email: jansen.wiratama@umn.ac.id

INTRODUCTION

Within the state, residents of the country need to arrange certain papers related to population administration or specific permits. The law stipulates that the government should provide services to its people. (Ismail & Ismail, 2022). Several population administration letters or permits require a letter of introduction from the authorized local leader, namely Rukun Tetangga (RT), Rukun Warga (RW), or Village Head for villages. In practice, processing documents and permits still use a conventional service system that uses paper.

Some villages have developed administrative information management systems such as using Microsoft Word or Microsoft Excel applications to help record, store and manage their village population administration, one of which is Puncung Village, located in the Karawang area. Puncung Village already uses Microsoft Word and Microsoft Excel to record and manage the administration of its residents. However, Puncung Village also continues to use ledgers and manual forms. This activity has not significantly impacted because administrative management remains slow, and villagers feel that much time is spent getting services (Agnitia LEstari et al., 2021). From the case of Puncung Village, it can be concluded that the use of technology in supporting the administrative management of the population will only have an impact if it is carried out optimally.
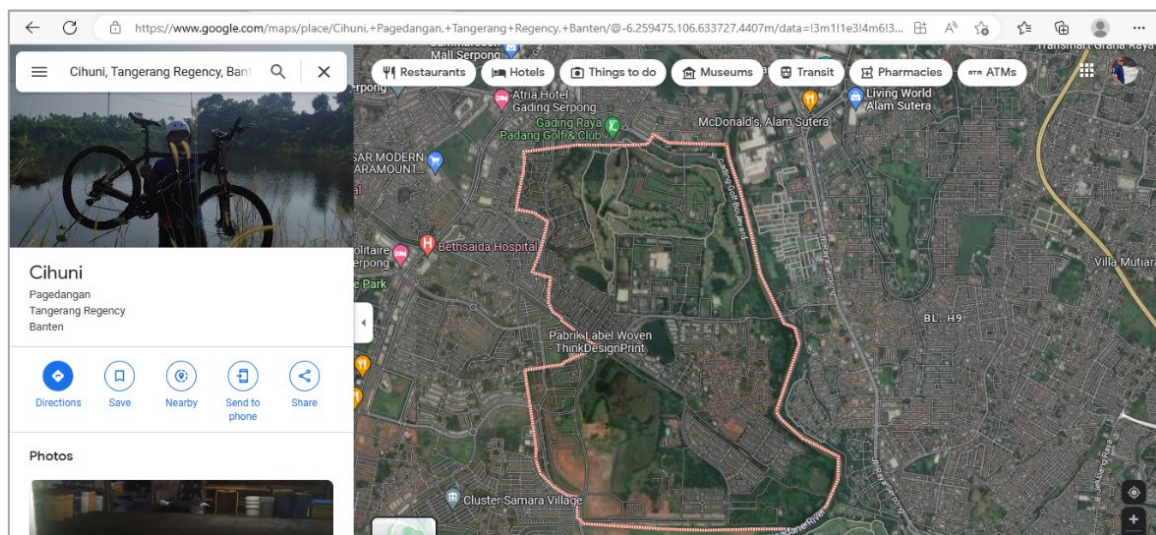

Figure 1. The area of Cihuni Village is displayed on Google Maps (*Cihuni Village, on Google Maps*, 2023)

Apart from Puncung Village, Cihuni Village, located in Tangerang Regency, also needs to make maximum use of technology in managing its population administration. Cihuni Village is in Indonesia, located in Pagedangan District, Tangerang Regency, Banten Province. Gading Serpong Housing is located in this village, including housing from Summarecon Serpong and Paramount Serpong. Based on data obtained from Google Earth and Google Maps shown on Figure 1, it was found that the area of Cihuni Village is ± 571.70 ha.

Data from the Tangerang Regency Central Statistics Agency (BPS) in 2020 shows that Cihuni Village has a population of 7,111 people. Of the total population, 3,949 people are male and 3,762 females. With such a large population, excellent and correct administrative services are needed for the community. Cihuni Village executive officers still use conventional methods, such as paper forms, to facilitate residents submitting certain documents. Storing paper documents using cupboards will make it easier for administrative officers to search for relevant citizen documents. Apart from that, the conventional method requires residents to come directly to the village office to submit the documents required by residents. This activity makes administrative services seem slow and requires many resources, such as time and energy, to provide or obtain administrative services.

From the problems found, solutions that can be used to overcome existing issues are to optimize village administration services by designing a computerized village information system. The simple definition of a system is a collection or set of elements, components, or variables that are organized, interact with each other, depend on each other, and are integrated (Sutabri, 2012). The village information system is a complex system that can help villages manage villages better and more efficiently (Fahri, 2020). The information system design will be website-based. The website base is chosen, considering the ease of access it has. Websites support efficient mobility by being accessible anytime and anywhere as long as the internet network is available (Sumpiuh et al., 2017). Apart from that, the website allows it to be accessed from various devices such as mobile phones, computers, laptops and other devices that can access the internet. The village information system for Cihuni Village was designed and proposed to provide a solution to help administrative officers improve the quality of administrative services for their residents so that residents receive easy and efficient administrative services. In addition, the design of a village information system is expected to assist officers in recording, storing and managing applications made by village residents.

Previous research that is still related to this research is used as a reference to strengthen the basis of this research. It started from the village information system website with the PHP programming language as the back-end which became the village information media (Asmara, 2019) and public information system dan sistem informasi publik (Melinda et al., 2018), then the village population information system (Purba et al., 2017). Apart from that, the system development models used in designing village information systems are also diverse, namely the prototyping model in designing village information service websites (Kurniawan et al., 2020), the extreme programming model (febriantoro, 2021), the WDLC model (Wiratama & Desanti, 2022), to the RAD model (Wiratama & Ikana Desanti, 2022). One of the novelties produced through this research is that the user will only focus on designing a website-based information system with users by village officials and will not be used by residents or local communities. The information system will be designed to manage requests or submissions from residents regarding the processing of documents or permits, which require the involvement of local village officials as a government unit. The conclusion that can be drawn now is that the use of conventional paper systems in Village Administration Services is ineffective and less efficient. Therefore, designing a village information system is proposed to assist village administration officers in providing better administrative services. The village that will be used as the research object in this research is Cihuni Village.

RESEARCH METHODOLOGY

Rapid Application Development (RAD) is an incremental system development method, especially for projects with a relatively short processing time. RAD adapts the waterfall development method but with a shorter time. The RAD method has four steps that need to be carried out: requirements planning, user design, construction, and cutover (Putra & Lolly, 2021). Figure 2 shows the system development workflow, which uses the RAD method. RAD applies an iterative or iterative method for system development in which the workflow determines user needs (requirement planning), which will be used as a basis for system development from user design to implementation (cutover) (Jijon Raphita Sagala, 2021). Compared to the Agile and Scrum development methods, the RAD development method was chosen because system development can be done quickly and requires only a few human resources. In addition, RAD itself is widely used as a method for designing website-based systems. This characteristic of the RAD model certainly supports the implementation of this research, which has a short time and limited resources. With the performance of the RAD method in system development in this study, the stages to be carried out can be explained in four points (Nurman Hidayat & Kusuma Hati, 2021):
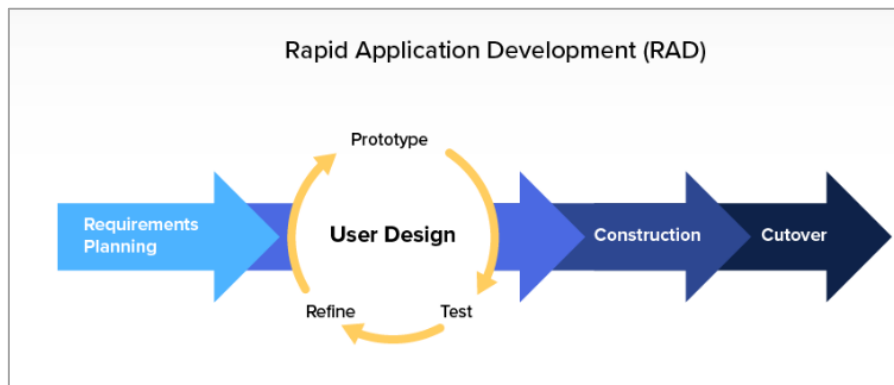
Figure 2. Rapid Application Development model stage

Stage 1-Requirement Planning

In this stage, data will be collected from users regarding what system users need. These needs also include solutions to problems that users may be experiencing before the system is designed. This stage will begin by collecting data using a direct interview method with sources, in this case, Cihuni Village administrative officers. Interviews were conducted to receive information on the needs of administrative officers in the system. The data that has been obtained will be processed to ensure that the information system will be designed with features that suit your needs. The results of interview data processing will produce output in the form of decisions on features that will be included on the village information system website.

Stage 2-Design for Users (User Design)

This stage is the system design stage that is adapted to the needs that have been obtained during requirements planning. At this stage, the features included in the village information system website are based on the output during the requirements planning stage. The system will be designed in such a way with features that have been adapted to your needs so that it is hoped that it can solve your problems. This stage will produce output as a Unified Model Language or UML design. The UML created will consist of three diagrams: use case, activity diagram, and class diagram. Apart from UML, this stage will also produce a website design in prototype form.

Stage 3-Design and Evaluation (Rapid Construction & Feedback)

At this stage, the website-based village information system will begin to be designed based on UML diagrams and prototypes created at the user design stage. The website is designed using the HTML, CSS and JavaScript programming languages, supported by the Bootstrap version 4 framework for the design part and the PHP programming language, supported by the Laravel version 8 framework. The output produced at this stage is a website in the form of a whole system ready to use.

Stage 4-Implementation (Cutover)

At this stage, the system ready to use will be tested to determine whether the designed features are running well or whether there are system defects (bugs) or feature failures that interfere with the website's running. The testing process will use the basic User Acceptance Test or UAT. By testing using UAT, it is hoped that you can produce test results that determine whether the website is running well or whether something still needs improvement.

User Acceptance Test (UAT) is done by directly connecting the user with the system to prove that the designed features are running and following the user's needs. UAT testing occurs when the system has been developed and all features can be run optimally (Chamida et al., 2021). UAT is one of the most innovative methods for preventing errors in Information Technology projects (Afrianto et al., 2021).

RESULTS AND DISCUSSIONS

In the **implementation of stage 1 of the RAD model**, interviews with representatives of Cihuni village officials were conducted, namely the village secretary, who also represented all administrative officers in Cihuni Village. The interview was conducted onsite at the Cihuni Village Head's Office by asking several questions related to the ongoing process of administrative services. Some of the documents generally taken care of by residents through the Village Head's Office include the management of Cover Letters for Family Cards, Application Forms for Changes to Family Cards, and Application Forms for Resident Identity Cards. The results of the interviews were then observed and became user requirements.

Website design **(stage 2)** begins with the initial website setup you want to build. In this study, the initial plan was carried out using the Unified Modeling Language (UML) concept. The Unified Modeling Language in the Future, or UML, is a tool for designing software with an object-oriented idea (Sonata, 2019). In this study, case diagrams and activity diagrams are used to visualize system design plans.
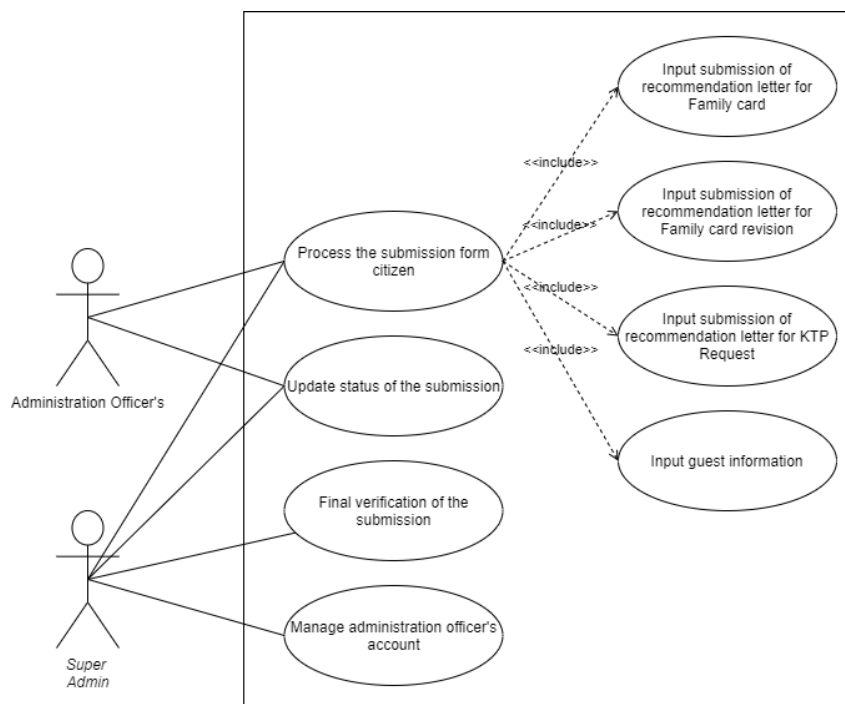

Figure 3. Use Case Diagram of the proposed information systems.

The use case diagram in the design of the village information system website is shown in Figure 3. The use case diagram has been adapted to the user's primary needs, namely the village administration officer. In this case, users are divided into SuperAdmin and village officials. In the future, the two parties will be referred to as the actors involved in the system.

In Figure 3, it can be seen that the two actors are given access rights to all features following their duties as administrative officers. The two actors, namely SuperAdmin and Administrative Officer, have the same access rights, including processing document submissions made by village residents, generating submitted documents in digital form and updating information regarding the status of document submissions. However, the SuperAdmin actor has special access rights not granted to the Administrative Officer actor. These access rights include, among other things, carrying out final verification in submitting citizen documents and managing village administration officer accounts, such as creating accounts, knowing the list of officer accounts, changing officer account data, and deleting officer accounts.
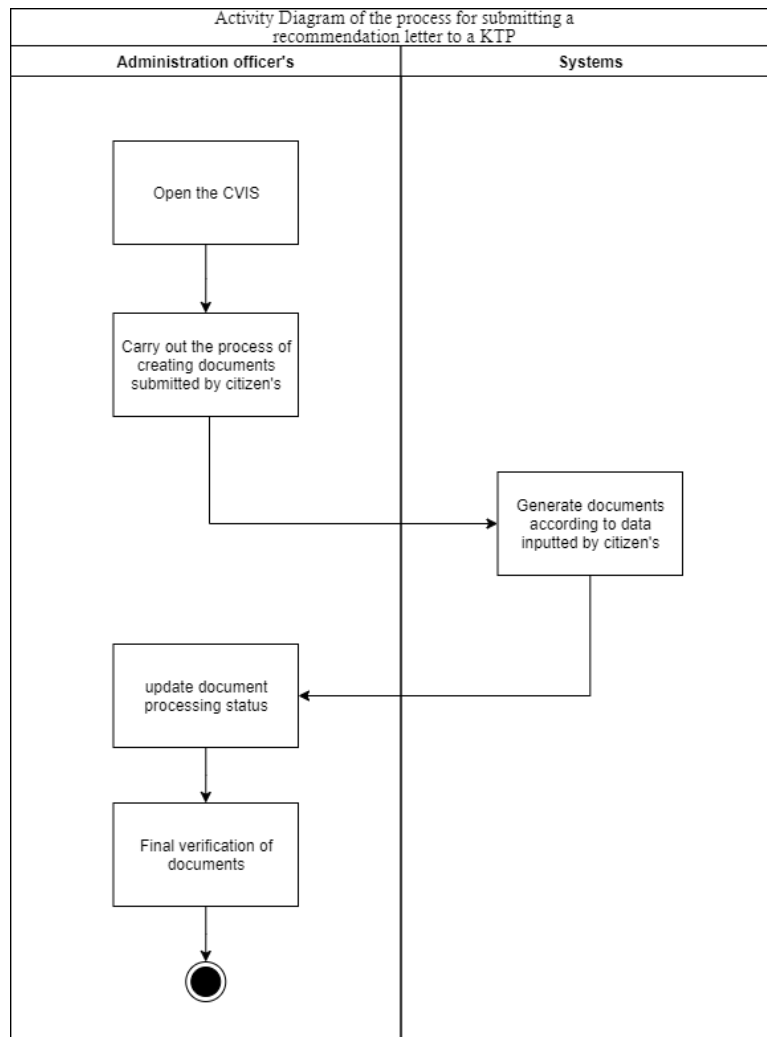
Figure 4. Activity Diagram of the process for submitting a recommendation letter to a KTP

Figure 4 shows the process of administrative officers processing citizen submission documents for an introduction to making an Identity Card (KTP). In this process, the initial stage carried out by the administration officer is to open the citizen application page in the Introduction to KTP section. After that, the officer will process the application and generate a cover letter for making a KTP, which will produce documents in digital form. After the document has been successfully developed, the authorized officer will carry out the final verification of the existing record.

The following step of this RAD model implementation on this research is **Stage 3**, Construction. The Cihuni Village Information System website, referred to as the Cihuni Village Information Systems (CVIS), was developed using HTML and CSS for the front-end section, which is used to support the user interface (UI) and supported by the Bootstrap framework version 4. However, the back-end section, which functions as a program to run the website and connect the front-end website to the database, is developed using the PHP programming language, supported by the Laravel version 8 framework. Bootstrap version 4 and Laravel frameworks facilitate website development and connect databases locally. The appearance of CVIS is shown through the following explanation:
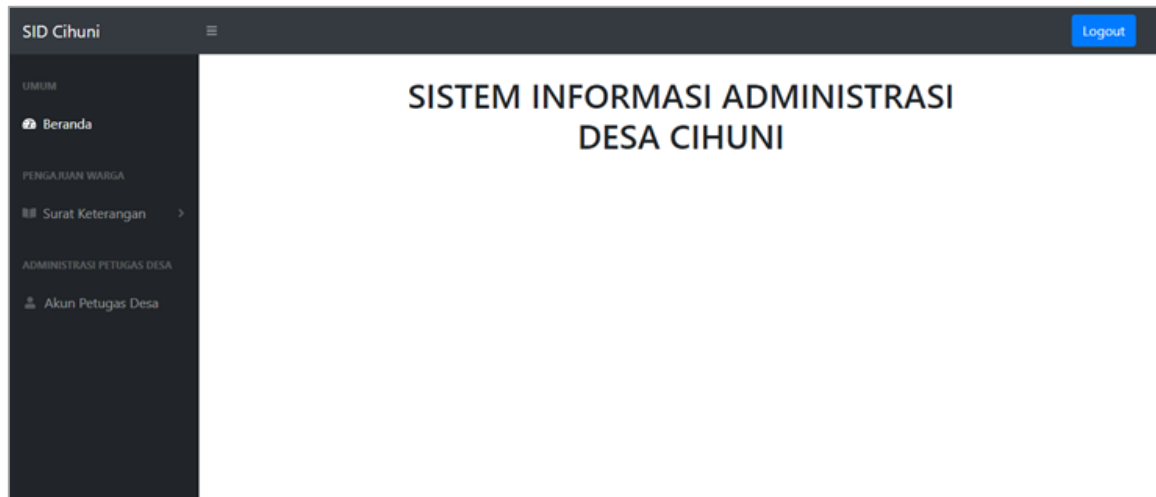
Figure 5. Dashboard of Cihuni Village Information Systems (CVIS)

Figure 5 is the dashboard page accessed after the officer has successfully entered the registered cellphone number and password. The home page becomes the main page when officers log in. This page only provides information, such as the full name of the website and the current username. Left-side and top-side navigation and a button to log out of the officer's account are available on every website page. Figure 6 shows the display of the monitoring page for the cover letter for the Resident Identity Card (KTP). This page contains a table containing the information needed to obtain a cover letter for making a KTP from the village. Figure 7 features updating document process status and generating documents automatically.
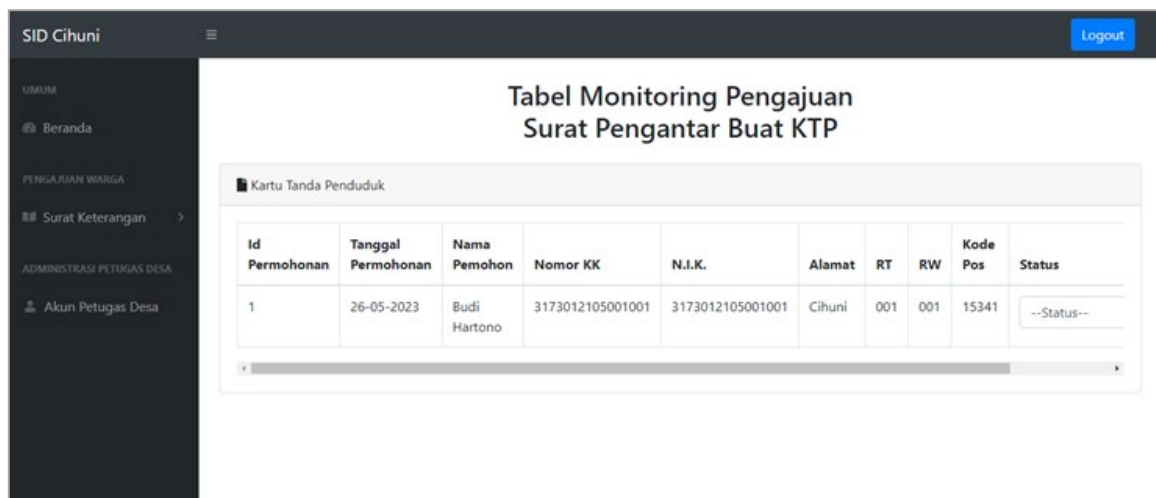

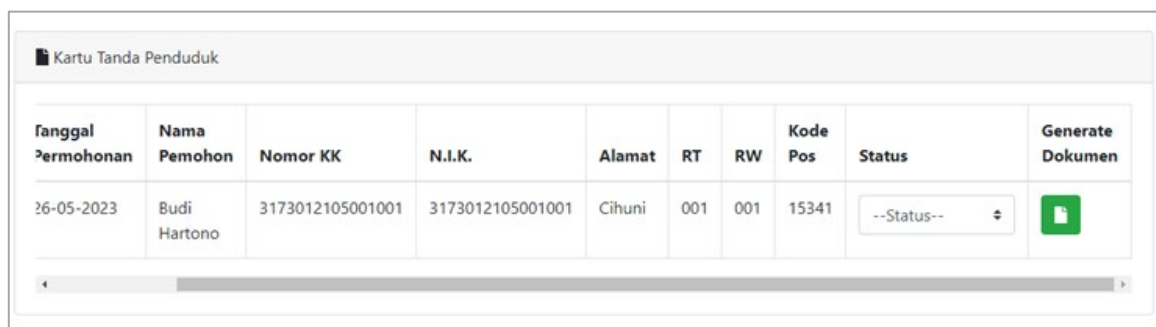**Figure 6.** Monitoring page for submission of cover letter for KTP

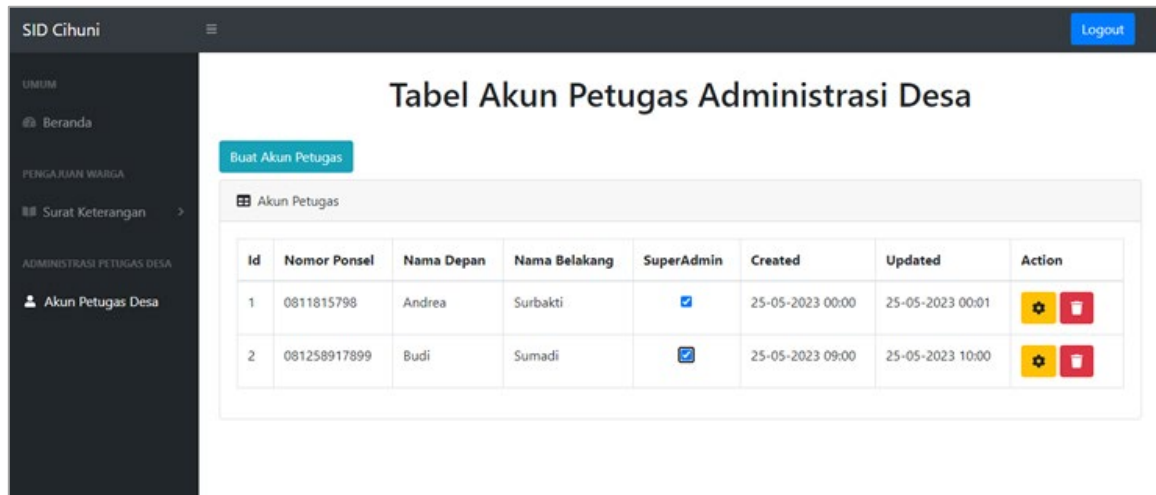**Figure 7.** Generate documents and documents status.

Figure 8. Administration officer's management page

The village administration officer's account is the key so officers can access all CVIS pages, especially the monitoring page for submitting documents. Therefore, one page on the website is needed to manage village administration officer accounts. Figure 8 is a page where village administration officers can manage their accounts. There is a table containing account information for each officer, such as ID, registered cellphone number, officer's name, officer's access rights, time when the account was created, and when the account changed. Access to this page can only be done by accounts assigned as SuperAdmin. If the account being logged in is not SuperAdmin, then in the side navigation of that account, the access menu to the village officer account page will not appear, as shown in Figure 8

When the design of the Cihuni Village Information System (CVIS) website has been completed, the website is then shown to the Cihuni Village Secretary, who also represents the existing Cihuni Village administrative officers. Following the **Stage 4 (Cutover)** on this RAD model, on this occasion, the CVIS website was also tested using the User Acceptance Test (UAT). The following feedback was generated from the presentation and results of the tests carried out, which is explained in Table 1.

Table 1. User Acceptance Test (UAT) Results

Features	Test Case	Feedback *User*	Status
Log In	Open the login page, enter your email and password to log in.	1. The login page has been successfully accessed. 2. Replaced the email column with a cellphone number as log in information (fixed).	valid
Monitoring	Open each monitoring page for citizen document submissions and explain the columns of the table and the features on the menu.	1. The menu is easy to understand. 2. If it can be managed, a feature can be added to generate documents automatically.	valid
Administration officer's user account	Explains the officer account management page, how to create a new officer account, and explain the differences between SuperAdmin and Non-SuperAdmin access rights.	Overall is good	valid

The UAT results for the CVIS are good and show that the system meets user requirements. Here's a simple breakdown: Login: Users can create accounts and log in easily. The login feature works as expected, allowing access to the system. Monitoring: Citizens can track their submissions.

This means the monitoring feature works well, helping users monitor their submissions. Administration Officer's User Account: The super-admin can successfully create accounts for village administration officers. Users (likely administration officers) can manage their accounts, including editing profiles and changing passwords. The UAT confirms that the CVIS meet user needs and work correctly. The system handles user registration and login, allows citizens to monitor submissions, and provides administrators with account management tools. This means the system is ready for use by its intended users.

Cihuni Village Information System website was designed based on problem analysis, user needs, and feedback from the village secretary. It received positive feedback. The system runs on laptops or personal computers, using XAMPP for local server testing and PhpMyAdmin for database management. The website will be hosted for easy access through Niagahoster. Before CVIS, residents had to visit the village head's office to prepare documents, requiring time and effort. They couldn't monitor the process and had to return to inquire about their documents. Managing physical forms was challenging and took up space, with the risk of loss or damage. CVIS changed this by allowing officers to quickly receive and manage applications. Residents can check document statuses via a mobile app. The website eliminates the need for physical document storage, as everything is securely stored in a database. It also simplifies retrieving citizen applications and monitoring submissions for village administration officers.

CONCLUSION AND RECOMMENDATION

Conclusion

This research concludes that the RAD model is proven capable of being implemented for designing website-based information systems with short processing time and limited resources. The test results with the UAT method also get test results for each test case, which indicates that the function of the information system created is following the needs of Cihuni Village.

Recommendation

For further development, it is recommended that the CVIS be developed with several features that are not currently available, such as notifications when there are service requests, email notifications, chatbots and implementation of database system security so that they can become data security for residents of Cihuni village.

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