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Digitizing Village Administration in Sleman with a Web-Based System using RAD Method

Dita Rizki Amalia[*a], Riyan Farismana[b], Dian Pramadhana[c]

[a,b,c]Politeknik Negeri Indramayu, West Java, Indonesia

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Abstract

This community service initiative focuses on developing a web-based information system for village administration in Sleman Village, located in the Sliyeg District of Indramayu Regency. In the Technology 4.0 era, integrating digital technology is crucial to addressing the complexities of IT infrastructure and enhancing organizational competitiveness in the global arena. Sleman Village, within the local government framework, struggles with managing administrative data manually, which limits information accessibility and transparency. This community service aims to identify the obstacles and requirements in managing village administrative data and to implement a web-based administration information system. The project's approach includes conducting partner surveys, customizing the system to meet the village's needs, preparing for implementation, and conducting a final evaluation. By making the village administration information system accessible to the public, administrators, and village staff for administrative tasks, particularly letter submissions, the system results in a customizable design, collaboration with stakeholders, user-friendly features, phased training and assistance, and improved public accessibility.

Keywords: Community Service Initiative; Web-Based Information System; Village Administration; Digital Technology; RAD Method

1. Introduction

The Industrial Revolution 4.0 era drives digital transformation (Kraus et al., 2021) across various sectors, including village administration. Sleman Village in Sliyeg District, Indramayu, needs an information system (Institute of Electrical and Electronics Engineers. Chile Section et al., 2017) to manage administrative data more neatly and efficiently.Digital transformation involves using new digital technologies (Wang & Huang, 2024) such as social media, mobile technology, analytics, or embedded devices to achieve significant business improvements, such as better customer experiences, higher operational efficiency, or the creation of new business models(Prause, 2015) . This information system is expected to help enhance the accountability of the village government to the community by providing transparent and easily accessible village administrative data.

The village administration information system is an integral part of the overall information system (Dyda et al., 2024) in the context of local governance. The village administration information system is specifically designed to support administrative and operational activities at the village level or lower regional government. However, the village administration information system (Simangunsong & Djaga, 2018) does not stand alone as it is connected to the broader information system within the larger administrative and governmental network. First, the village administration information system is usually integrated with larger government information systems (Cordella & Iannacci, 2010) at the district or provincial level. Information generated from the village administration system, such as population data, village finances, or development projects, can be channeled into larger government information systems for reporting, monitoring, or interregional coordination purposes. Second, the village administration information system also interacts with national or central information systems. Information collected from various villages can be used to formulate national or regional policies, allocate resources, and support sustainable development planning. Additionally, the village administration information system can connect with information systems of other sectors, such as education, health, or local economy. This integration allows for cross-sector information exchange, which can enhance the efficiency and effectiveness of public services (Savunen et al., 2024) and support better decision-making at the village level.

Sliyeg is a district in Indramayu Regency, West Java Province, Indonesia. Geographically, it is located in the eastern part of Indramayu and is about 24 km from the regency capital (Indramayu), 180 km from the provincial capital (Bandung), and 208 km from the national capital (Jakarta). It has 14 villages, 66 RWs (community units), and 287 RTs (neighborhood

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units). Administratively, Sliyeg District borders the following: to the west, it borders Jatibarang District; to the east, it borders Juntinyuat District and Kedokanbunder District; to the south, it borders Kertasemaya District; and to the north, it borders Balongan District and Indramayu District.

One of the villages in Sliyeg District is Sleman Village, which is located at the border between the Sleman Lor area and is bordered to the south by Jl. Raya Jatibarang Karangampel and to the east by Tambi Village. Sleman Village is an old village and is considered an advanced village in the Sliyeg area, with a population of approximately 5,277. The occupations of the residents are 65% farmers, 10% private employees, 20% traders, and 5% brick makers. The center of administration is located on Jl. Raya Jatibarang Karangampel. Sleman is a multi-ethnic village with residents from Padang, Sundanese, Eastern Javanese, Chinese, and Dayak ethnicities.Sleman is also known as an art village, evidenced by the various forms of art present in the village, such as organ tarling (Erna Jaya), singa gotong, and wayang kulit. Additionally, the village is renowned as a student village, with educational facilities including one MDA (Madrasah Diniyah Awaliyah), three elementary schools (SD), and one senior high school (SMAN).

With the availability of such data, there is a need for a system to manage village administrative data more efficiently. This system can help improve the efficiency of village administration by automating routine processes, particularly administrative documents as highlighted in the research (Wiratmoko & Lambelanova, 2021). Consequently, the time and resources required for administrative tasks can be optimized. Additionally, this system allows for more transparent monitoring and tracking of village fund usage and the implementation of development programs. This helps to enhance the level of accountability of the village government to the community.

2. Literature Review

2.1 Digitizing

Digitizing refers to the conversion of information into a format that computers can read. This process can apply to various types of data, such as text, images, audio, and video. Digitizing rural areas in Indonesia is a multifaceted and diverse effort that necessitates a thorough understanding of the unique challenges and opportunities present in each village. By taking proactive steps and leveraging digital technology, Indonesia can create sustainable digital villages, improving the welfare of rural communities and significantly contributing to the nation's economic development (Nugroho et al., 2023).

Smart villages are rural areas and communities that leverage their existing strengths and resources while seeking new opportunities. They enhance both traditional and new networks and services through the use of digital and telecommunication technologies, innovation, and better utilization of knowledge. Digitalization can accelerate the transition and innovation occurring in the analog world. In villages, digitalization can be effectively implemented through collaboration among businesses, citizens, and local governments (Malik et al., 2022).

2.2 Public Administration

Public administration involves carrying out and overseeing government policies and programs. This entails organizing, planning, directing, coordinating, and supervising government activities. Public administrators operate at various governmental levels—local, state, and federal—and are tasked with ensuring that public services are provided to the public in an effective and efficient manner (Liu & Yuan, 2015).

Public administration includes a wide array of activities and duties performed by public organizations that not only implement but also often help shape government policies. These organizations function at different levels of government—local, state, and federal—and are essential to the smooth operation of society by transforming governmental directives into effective public programs and services. Core Components of Public Administration are ; Policy Implementation, Policy Development, Organizational Structure, Planning and Coordination, Management and Supervision, Regulation and Oversight, Service Delivery, Accountability and Transparency, Ethical Standards and Adaptation and Innovation (Madan & Ashok, 2023).

2.3 Information System

Information systems (IS) involve a dynamic interplay between humans and computers, each playing a crucial role in processing and interpreting information. Information systems are crucial for modern organizations, enabling seamless interaction between humans and computers. By effectively integrating hardware, software, data, procedures, and people, these systems support efficient data processing and in-depth information interpretation, which in turn drives better decision-making and enhanced organizational performance (Putro et al., 2024). In summary, the characteristics of information systems include:

1. Integration: Combines hardware, software, data, procedures, and people to function as a cohesive unit.
2. Efficiency: Optimizes data processing and automates tasks to enhance productivity.
3. Scalability: Can grow and adapt to increasing demands.
4. Accuracy: Ensures that processed data is accurate and up-to-date.

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5. Security: Protects data from unauthorized access and breaches.
6. Usability: Features user-friendly interfaces and provides support.
7. Flexibility: Can be customized to meet specific organizational needs.
8. Data Management: Efficiently stores, organizes, and analyzes data.
9. Communication: Facilitates both internal and external communication.
10. Decision Support: Provides accurate information for decision-making and strategic planning (Wijayanti et al., 2024).

2.4 Web-based System

Web-based systems are applications or platforms that users interact with via a web browser over the internet or an intranet. They utilize web technologies to deliver a range of functionalities and services (Marbella et al., 2024). A web-based collaborative computer environment enables the communication of distributed applications such as design, visualization, estimating, planning, specifications, and supplier information. It also includes an intranet-based cost control system designed and implemented to automate the production of specific cost reports. Key features of web-based systems include:

1. Accessibility: Can be accessed from any device that has a web browser and internet access.
2. Centralized Data: Information is stored on a central server, enabling real-time updates and collaboration.
3. Maintenance and Updates: Simpler to maintain and update since changes are applied on the server side.
4. Scalability: Can be expanded to support more users and larger amounts of data.
5. Cross-Platform Compatibility: Usable on different operating systems and devices without needing special software installations (Chassiakos & Sakellaropoulos, 2008).

3. Method

3.1 System Development Method

Rapid Application Development (RAD) is a methodology in software development that emphasizes quick development and prototyping iterations over rigorous planning and testing phases. The main stages in RAD are as follows:

1. Requirement Planning: This initial stage involves gathering and understanding the overall project requirements. Stakeholders, including users, developers, and project managers, discuss the objectives, scope, and potential constraints. This phase is relatively short compared to traditional development methodologies.
2. User Design: In this stage, users and developers collaborate to create system prototypes. This iterative process includes creating mock-ups, user interfaces, and basic system designs to ensure that the requirements are met. Continuous feedback is gathered and used to refine the design.
3. Rapid Construction: The actual system development occurs in this phase. Developers use the prototypes from the User Design phase to build functional components of the application. This phase involves coding, testing, and system integration. Frequent iterations and user feedback are crucial to ensure the system meets user needs.
4. Cutover: The final stage involves transitioning the developed system into the production environment. This includes final testing, data conversion, user training, and deployment. Unlike traditional methods, the cutover phase in RAD is usually shorter due to the continuous testing and feedback loops in earlier stages (Beynon-Davies et al., 1999).

RAD emphasizes collaboration, user involvement, and flexibility, making it suitable for projects with rapidly changing requirements or tight deadlines.

Figure 1. RAD methodology (Sasmito et al., 2020)

3.2 System Architecture

Information System Architecture is a framework outlining the structure and functioning of an information system. It encompasses hardware, software, network, and data components essential for supporting an organization's operations and business objectives. This architecture demonstrates how different components interact and integrate to deliver the necessary information services (Pasieka et al., 2019).

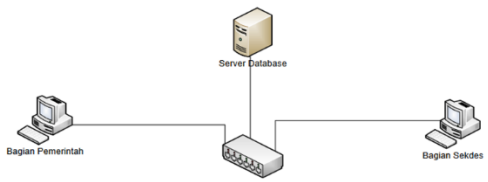

Figure 2. Information system architecture

The architecture of this system consists of an admin and a client, where communication between the actors occurs through the internet network.

3.3 Implementation Method

The implementation is focused on the process of adjusting the system to meet the needs of the partners until the created system can be applied and beneficial to the partners, in this case, Sleman Village. Below is

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the flowchart (Montero-Odasso et al., 2007) of the implementation that will be carried out.

Figure 3. Implementation method

In this activity, there are seven important stages to be carried out, including:

1. Partner Survey
   At this stage, the team meets with potential partners and assesses the suitability of these partners with the needs of the partner.
2. Signing Partner Agreement
   Once a suitable partner has been identified and agrees to become a partner in this implementation, an agreement to become a partner is signed.
3. Brainstorming Partner Needs and Issues
   At this stage, brainstorming sessions are held between the team and the partner to understand the partner's issues and to identify the system requirements that will be implemented.
4. Adjusting Information System to Partner Needs
   After understanding the problems and system requirements, the next step is for the team to adjust the information system to match the partner's needs, ensuring that the implemented system is truly beneficial.
5. Preparation of Facilities, Socialization, and Support
   This stage involves preparations before the system is fully implemented, including system architecture preparation, software and hardware requirements, socialization, documentation creation, and other preparations to support the implementation of the field practice monitoring information system.
6. Implementation
   During the implementation stage, the team configures the migration from the old system to the new one, conducts training, implements the initial stage of the system, and gathers feedback from real users.
7. Evaluation
   After the system is implemented, feedback from users and partners is evaluated and final improvements are made before the system is fully implemented and used by the partner.

4. Result

The results of the system design are as follows.

4.1 Use Case Diagram

This is a use case diagram of the website being developed. Both the public and the admin have their respective activities. A use case diagram is a visual representation that illustrates how users (actors) interact with the system, showing the various functions or processes (use cases) performed by the system (Patel et al., 2024).

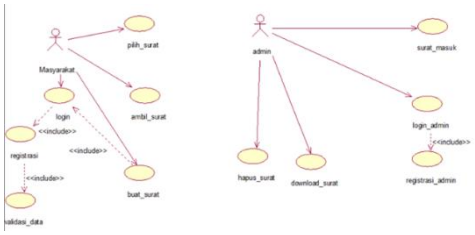

Figure 4. Use case diagram

Table 1. Use case activity diagram

No	Actor	Activity
1	User (Masyarakat)	Login, registrasi,pilih_surat,ambil_surat,buat surat,validasi data
2	Admin	Login_admin, registrasi admin, surat masuk,surat keluar,hapus surat, download surat

4.2 ER Diagram

An entity relationship diagram is a visual representation of the entities within a system and the relationships between them, used to model the data structure of that system (Cagiltay et al., 2013).

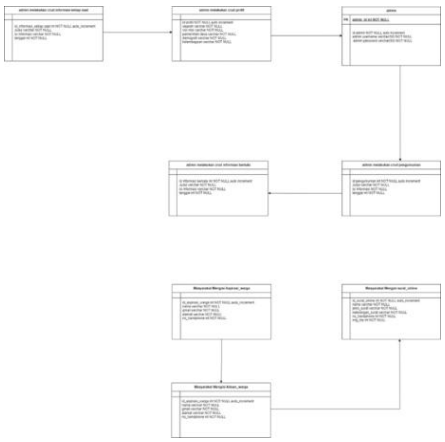

Figure 5. ER diagram

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4.3 Result

In this result there are interface of admin and user side.

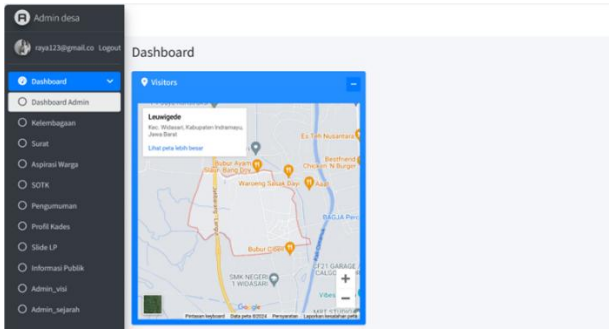

Figure 6. Admin dashboard

The admin dashboard page contains a village location map and includes menus for Institutions, Citizen Aspirations, SOTK, Announcements, Village Head Profile, LP Slides, Public Information, Admin Vision, and Admin History.

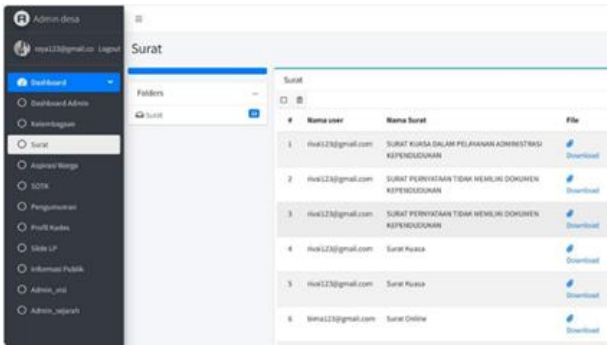

Figure 7. Surat/mail

The letter page contains a list of letters inputted by the user. The types of letters are as follows:

1. Power of attorney letter
2. Marriage permit letter
3. Population data application letter
4. Population data change application letter

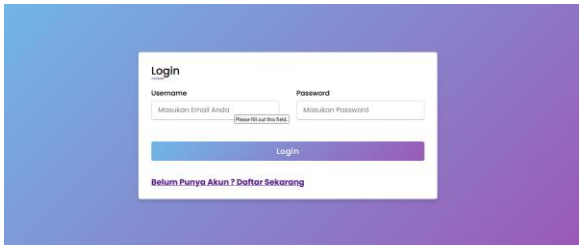

Figure 8. Login user

This page contains a login for users, including a username and password. If you do not have an account, you must register first.

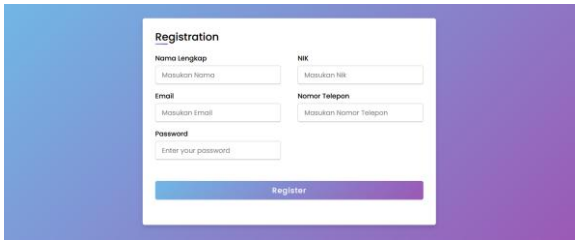

Figure 9. Registration

To register, you need to provide your full name, email, password, identification number, and phone number.

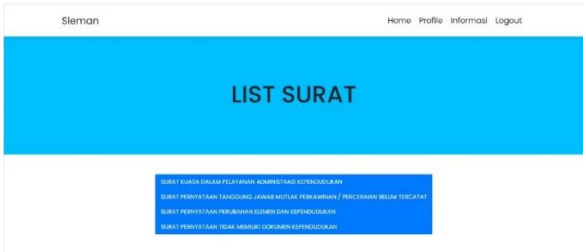

Figure 10. Mail List

Village residents can apply for a letter after registering according to the letters listed on this page.

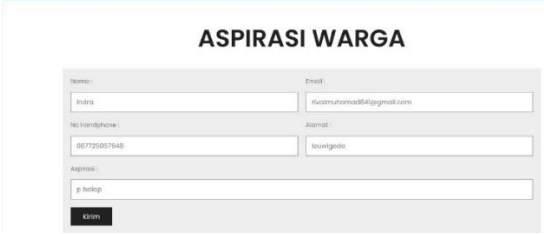

Figure 11. Citizen Aspirations (Aspirasi Warga)

On this page, residents can share their aspirations. The form includes fields for name, email, phone number, address, and aspirations.

5. Conclusion

The implementation of a web-based village administration information system in Sleman Village, Sliyeg, is an important step in utilizing modern technology to improve efficiency and transparency in village administration management. In the era of the Industrial Revolution 4.0, technologies such as blockchain, cryptography, the Internet of Things (IoT), and cloud computing play a crucial role in enhancing data security and transparency. This system is expected to not only automate administrative processes such as issuing letters and recording population data but also make it easier for the community to oversee and monitor the use of village funds and the implementation of development programs. This step will increase the accountability of the village government and enable active community

participation in the decision-making process and village development.

Additionally, the implementation of the village administration information system is essential for overcoming obstacles such as the complexity of IT infrastructure and the need for better data security. Understanding the vital role of the village administration information system in the context of local governance, such as its integration with larger government information systems and its ability to support national or regional policies, allows Sleman Village to leverage technology to optimize public services and improve administrative management efficiency. This implementation not only supports Sleman Village's digital transformation towards a more advanced and prosperous village but also sets an example for other villages in utilizing technology for local advancement.

For future plans to improve accessibility, our village will develop a mobile application that makes it easier for residents to access village information and services from their mobile devices. The application may include features such as notifications about village programs, submitted documents, and residents' feedback or suggestions.

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