



Design of Village Administrative Information System at Suka Makmur Village Using the Waterfall Method

Maria Indriyani Pinem^{1*}, Chandra², Hendri³

^{1,2,3}Information Systems Study Program, Stmik Time Medan
mariaindriyanipinem@gmail.com^{1*}, chandra.wiejaya@gmail.com², h4andr7@gmail.com³

Abstract

The administration of village public services plays a crucial role in ensuring citizens' access to essential public services. However, in Suka Makmur Village, administrative processes are still conducted manually using paper-based systems, which lead to several issues such as data loss risks, service delays, and difficulty in retrieving archives. This study aims to design a computerized village administrative information system to enhance the efficiency and effectiveness of public services. The research applies the Waterfall method, which consists of requirement analysis, system design, implementation, testing, and maintenance phases. The result is a web-based system capable of managing population data and correspondence digitally, thereby facilitating data handling for village officials. This system is expected to improve the speed, accuracy, and organization of village administrative services and reduce the risk of data loss. Ultimately, it contributes to the enhancement of public service quality at the village level.

Keywords: Administration, Information System, Village, Waterfall, Web-based

1. Introduction

The village is the smallest administrative unit in the governmental structure, playing a vital role in development and community empowerment. Efficient village administration management is essential to improve service quality and community participation. According to Government Regulation No. 47 of 2016, Chapter IV Article 4, proper and orderly village administration serves as a key source of data and information for governance, development, community guidance, and empowerment efforts [1]. Village administration covers critical aspects such as document management, village activity records, and public services. However, many villages still face challenges due to manual administrative processes, resulting in delays, difficulty retrieving data, and low accuracy. Scattered and unintegrated data often hinders effective and timely decision-making, affecting both the performance of village officials and the quality of public service [2]. With the advancement of information technology, implementing an information system in village administration has become increasingly relevant. These systems facilitate the management of documents, activity logs, and communication with residents. As stated in Law No. 6 of 2014, villages have the right to access information through village information systems developed by local governments, and local governments are obligated to support their development [3]. Many government agencies now utilize technology to communicate and deliver services more efficiently. Technology improves administrative accuracy, efficiency, and transparency, and enables stakeholders to access real-time information, enhancing public participation in village activities [4]. To manage these components effectively, accurate and up-to-date population data, organized correspondence records, scheduled activities, asset inventories, and financial reports are necessary. A suitable development method, such as the Waterfall model, significantly contributes to successful system implementation. This model includes sequential stages—requirement analysis, design, implementation, testing, and maintenance—allowing for structured evaluation and refinement at each step [5]. Therefore, this research aims to design and develop a transparent and efficient Village Administrative Information System using the Waterfall method. It will identify key features, assess their impact on administrative and public service effectiveness, and contribute to improving village governance quality in Indonesia. Based on this background, the research is titled: "Design of Village Administrative Information System at Suka Makmur Village Using the Waterfall Method."

2. Research methods

2.1. Analysis

System analysis is a technique or method for solving problems by breaking down a system into its constituent components to find out how these components work and interact with each other to achieve the system's objectives.

2.2. Process analysis

The current administrative service system in Suka Makmur Village operates mostly manually. Population administration is still recorded on paper, making data retrieval difficult and vulnerable to damage. Public service processes require verification by village officials, forcing residents to visit the village office multiple times, resulting in inefficiency and time loss. Additionally, records of development and village expenditures are kept in unsecured books or basic computer files, increasing the risk of data misuse. The existing system, being manual or semi-computerized, lacks efficiency, security, and effectiveness. Therefore, the development of an integrated village administrative information system is needed to improve service quality and transparency.

2.3. Analysis of methods used

This study adopts the Waterfall method, which consists of five main stages:

1. Requirements Analysis

System requirements were identified through interviews, observations, and document analysis related to administrative services in Suka Makmur Village. The main issues found include manual service processes, the need for repeated visits to the village office, and a lack of transparency in development and funding information.

2. Design

This stage involved creating a use case diagram to illustrate user interactions with the system and an Entity Relationship Diagram (ERD) for database structure. A responsive and user-friendly interface was also designed, including the main page, navigation menus, and data input forms.

3. Development

The system was developed based on the design. The backend was built using PHP and MySQL, while the frontend used HTML, CSS, and JavaScript. Key features implemented include population data management, document generation, and transparency information display. Testing

4. Testing

Functional testing was conducted to ensure features like login and data management work correctly. Integration tests ensured smooth interaction between modules. End-user testing was also performed to evaluate usability and operational suitability.

5. Maintenance

After deployment, the system underwent maintenance, including bug fixes, performance optimization, and updates based on user feedback. Input from village staff and residents helped ensure the system remains effective and relevant.

2.4. Analysis of the proposed system

The proposed system is modeled using a Use Case Diagram to illustrate interactions between users and the village administrative information system. This helps identify key system features and how users will interact with each process.

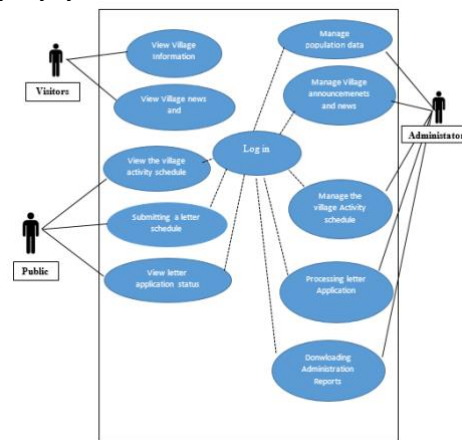


Fig. 1: Use Case Diagram

2.5 Database Design

Database design is the process of structuring data for the application being developed. It is carried out using an Entity Relationship Diagram (ERD), which serves as a basic data model that defines the relationships between entities. ERD helps model data structures and their relationships using standardized notations and symbols.

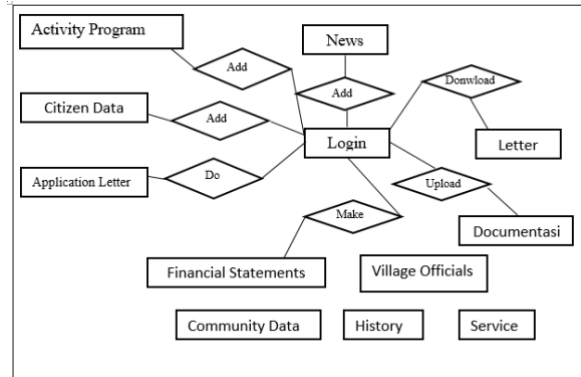


Fig. 2: Entity Relationship Diagram (ERD) of the Information System

3. Result and discussion

3.1. Website display result

The result of this study is a web-based Village Administrative Information System for Suka Makmur Village, designed to simplify the management and presentation of administrative data. The system enables users, especially village officials, to access, manage, and update essential data such as population records, correspondence documents, and other relevant information efficiently and effectively.

a. login page display

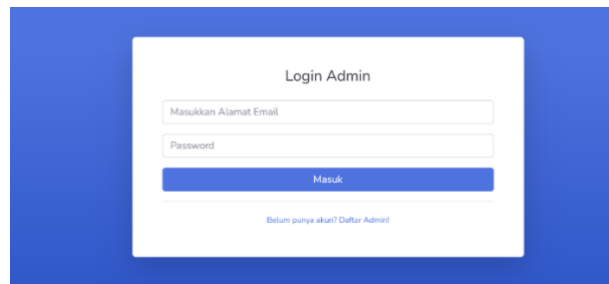


Fig. 3: Results of the login page display

b. Admin Home Page

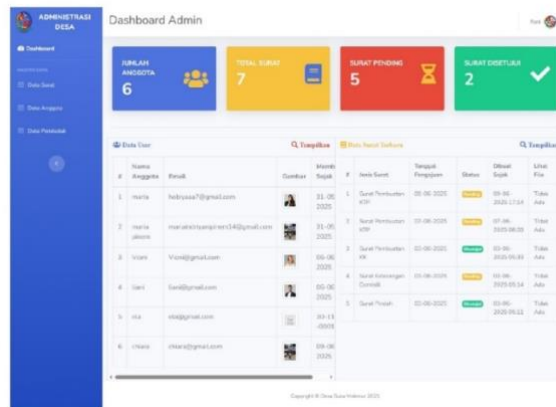


Fig. 4: Results of the Admin Home Page

c. Display of Certificate Data Generation

#	No. KTP	Nama Pemohon	Jenis Surat	Tanggal Pengajuan	Status	File Surat	Pilihan
1	898043	Sudi	Surat Keterangan Domisili	03-06-2025	Approved	Belum tersedia	Download Print
2	6320384	maria pinem	Surat Pindah	03-06-2025	Approved	Belum tersedia	Download Print
3	6526579	maria pinem	Surat Pindah	03-06-2025	Approved	Belum tersedia	Download Print
4	7087989	Maria Indiyani Pinem	Surat Keterangan Domisili	03-06-2025	Approved	Belum tersedia	Download Print
5	123456789000	viani	Surat Pembuatan KK	03-06-2025	Approved	Belum tersedia	Download Print
6	3307767963279626	Ela Wijaya	Surat Pembuatan KTP	07-06-2025	Approved	Belum tersedia	Download Print
7	7579898998007	chiana	Surat Pembuatan KTP	09-06-2025	Approved	Belum tersedia	Download Print

Fig.5: Display of Certificate Data Generation

d. Visitor Landing Page

Desa Suka Makmur Beranda | SD | Layanan | Data Desa | Daftar | Log in | Selamat Datang, Pengunjung

Sejarah Desa

Kondisi Desa Sukamakmur yang semula sulit dilalui kendaraan roda dua dan empat serta sebahagian dusun tidak terdapat penenangan listrik, hingga bila dibandingkan dengan desa lain yang lebih maju tidak serta-kan bahwa pada awalnya terbentuknya desa ini termasuk desa tertinggal.

Dalam pembangunan, terutama dalam bidang sarana dan prasarana serta informasi hingga pada saat ini juga jalan betaspal masih sedikit di Desa Suka Makmur, atau dengan kata lain sekitar 4 KM jalan betaspal. Sedangkan jalan poros dari desa Suka Makmur menuju Dusun XI Sembakkan Dua masih memungup lewat jalan kabupaten Karo.

SD Negeri 101852 berdiri sekitar tahun 1942.
 SD Negeri 106170 berdiri sekitar tahun 1950.
 SD 101840 yang berdiri sekitar tahun 1949 dan sekarang sudah layak.

Dalam bidang ekonomi, masyarakat Desa Sukamakmur yang mayoritas adalah petani/pesikubun belum sepenuhnya mampu mengolah pertaniannya dengan baik, sehingga sangat perlu untuk peningkatan pengetahuan dalam bidang pertanian demi tercapainya peningkatan ekonomi rakyat.

Dengan demikian kami simpulkan masih terdapat beberapa keluarga hidup di bawah garis kemiskinan di Desa Sukamakmur ini.

Demikian pun keadaan Desa Sukamakmur ini, kami optimis dengan terjalinnya kerja sama yang baik, disiplin dan sportifitas serta kerja keras yang didorong oleh iman yang kuat, maka kami ingin sejajar dengan desa-desa lain yang lebih maju dari desa kami.

Pemerintahan Desa

struktur aparatur Desa Sukamakmur

Kasi Keuangan Ela, Vival Guntung	Kasi Umum Arag Erson	Kadus I Rody M Sembang	Kadus II Pench Manarata

Visi

"MEWUJUDKAN MASYARAKAT SEJAHTERA, MANDIRI, BERKEADILAN, MIRATA DALAM PEMBANGUNAN SERTA RAS AMAN DAN NYAMAN BERLANDASKAN KEKELUARGAAN DAN IMAN"

Misi

1. Pembinaan mental dan spiritual pada masyarakat terutama pada anak-anak muda.
2. Pembinaan sportifitas, disiplin dan kerja keras serta semangat bergotong royong
3. Melaksanakan pendidikan pada anak-anak usia dini maupun usia sekolah 12 tahun dengan menekankan pendidikan moral dan beradab untuk menciptakan suasana aman dan nyaman di Desa Suka Makmur ini.
4. Melakukan pembangunan fisik maupun nonfisik secara berkala dan berkelanjutan yang bermanfaat mengikut sertakan warga Desa Suka Makmur.

Kontak Layanan Kantor Desa
 Alamat: Desa Suka Makmur, Kecamatan Kutalimbaru, Kabupaten Deli Serdang, Sumatera Utara
 Telepon: 0821-1234-5678
 Email: desasukamakmur@gmail.com

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Fig.6: Visitor Landing Page Result

e. Certificate Request Service Display

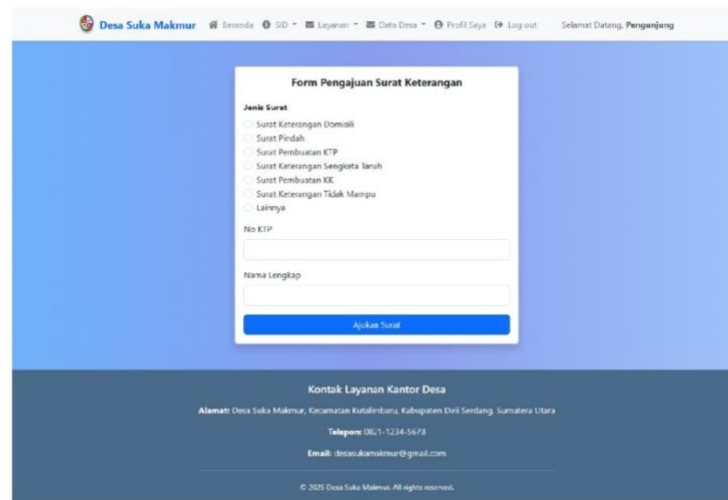


Fig. 7: Certificate Request Service Display

4. Conclusion

After the research was completed, the following conclusions can be drawn:

1. The developed Village Administrative Information System includes comprehensive features for data recording and archiving, making data retrieval easier and ensuring information is not easily damaged, as it is stored in digital format.
2. The system records and presents data to the public, promoting greater transparency and helping prevent potential misuse of village funds.
3. The application of the Waterfall method in developing the village administrative information system has proven effective in producing a web-based application that functions well and meets user needs.

5. Suggestions

The author suggests that the village authorities or administrators of the village administrative information system further develop the system to be more flexible and accessible to the community. One possible effort is to transform the current web-based system into a mobile application that can run on both Android and iOS devices. With a mobile application, users such as village officials and residents can easily access various administrative services anytime and anywhere via their smartphones. This would improve service efficiency, accelerate administrative processes, and support the digitalization of public services at the village level. Furthermore, future development could also include enhanced data security and easier integration with other service systems at the sub-district or district level.

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