

Design and Implementation of a Web-Based BUMDes Application for Jati Sari Village, Padang Tualang District, Langkat Regency

Ika Widya Sari, Eka Putra, Herdianto

Abstract

Village development plays a crucial role in achieving sustainable national progress, particularly through the empowerment of local economic institutions such as Badan Usaha Milik Desa (BUMDes) or Village-Owned Enterprises. Jati Sari Village, located in Padang Tualang District, Langkat Regency, possesses significant potential in agriculture, services, and trade sectors. However, the management of its BUMDes operations remains conventional and manually organized, leading to inefficiencies in data handling, limited transparency, and difficulties in reporting and evaluation. To address these issues, this study aims to design and develop a web-based BUMDes management application that supports effective, transparent, and digitally integrated operations. The system was developed using the Waterfall software development model, with PHP as the main programming language and MySQL as the database management system. Data were collected through observation, interviews with BUMDes administrators, and literature review. The developed system includes several key modules such as user management, financial reporting, savings and loan data management, population records, and service transactions. System testing was conducted using black-box testing and user acceptance testing (UAT) involving BUMDes administrators and village officials. The results showed that all main features performed according to specifications, with an average usability score of 80 (categorized as good). The implementation of this application improved administrative efficiency, enhanced data accuracy, and increased public trust in BUMDes management. In conclusion, the web-based BUMDes application successfully provides an integrated platform for managing village economic activities. It supports transparency, accountability, and accessibility for both administrators and the community. Future development is recommended to include online payment integration, cloud-based backup systems, and advanced data analytics to strengthen digital-based rural economic governance.

Keywords: Village-Owned Enterprise, BUMDes, Web-Based Application, Information System, Digital Village

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Introduction

Village development is a strategic aspect of sustainable national development. The Government of Indonesia, through Law Number 6 of 2014 on Villages, has encouraged villages to become more independent in managing their local potential and financial resources. One of the key policies supporting this effort is the establishment of Village-Owned Enterprises (BUMDes), which serve as community-based economic institutions managed by both the village government and local residents to improve the welfare of rural communities[1]. Jati Sari Village, located in Padang Tualang District, Langkat Regency, possesses considerable local potential in the sectors of agriculture, services, and trade. However, the optimization of these potentials remains constrained by weak management systems within the village enterprise[2]. In many cases, BUMDes operations are still managed conventionally and have not yet adopted digital technology. This condition results in administrative irregularities, low transparency, and limited access to information and public services[3]. Currently, the BUMDes of Jati Sari faces several administrative and technical challenges that directly affect operational efficiency and community trust. Important documents and data, such as financial reports, transactions, and inventory records, are still managed manually either in paper form or simple spreadsheets. This makes searching, summarizing, and reporting processes inefficient[4]. Manually managed systems often lead to data duplication and loss of critical information over time[5]. BUMDes Jati Sari manages several business units, such as integrated agriculture and agricultural equipment rental services. However, without a digital reporting and dashboard system, the performance of each business unit is difficult to evaluate periodically. This situation hinders continuous improvement and monitoring processes[6]. Meanwhile, communities today are increasingly accustomed to digital services in various aspects of daily life. Unfortunately, BUMDes Jati Sari has not yet implemented an online system for product orders, service delivery, or complaint reporting, even though digitalization of public services has been proven to enhance satisfaction and community participation. BUMDes plays a vital role in driving the economic development of rural areas[7]. However, without the support of a reliable information system, this potential cannot be fully optimized. Therefore, the design and development of a web-based BUMDes application becomes a strategic step toward realizing more effective, transparent, and inclusive enterprise management. With the right technological approach, BUMDes Jati Sari is expected to evolve into a professional and sustainable digital-based driver of local economic growth[8].

Literature Review

1. Information Systems in BUMDes Management

Manual administration in BUMDes management such as the use of paper documents and simple spreadsheets often results in data duplication and the loss of important information. Manual systems also slow down financial reporting and data recap processes. By implementing a web-based information system, data management can be carried out centrally, in real time, and can be easily accessed by both administrators and the community. Furthermore, digital administrative systems improve efficiency and accuracy in strategic decision-making within BUMDes management[9].

2. Digitalization of Village Public Services

The digitalization of public services at the village level plays a crucial role in improving transparency, community participation, and service speed. A website-based system allows the public to access business information, make transactions, and submit complaints or feedback directly. The implementation of digital technology also encourages villagers to become more

actively involved in monitoring and developing BUMDes operations, thereby strengthening their sense of ownership and trust toward the local economic institution[10].

3. Design and Development of Web-Based Information Systems

The importance of designing web-based information systems to enhance the performance of village organizations. By adopting system development methodologies such as the Waterfall or Prototype model, the design process can be carried out systematically from requirements analysis, system design, and implementation to testing. A web-based system not only simplifies financial and inventory data management but also provides analytic dashboards that assist administrators in monitoring the performance of business units periodically. Therefore, web applications serve as a strategic solution in realizing effective, transparent, and sustainable BUMDes governance[11].

4. Utilization of Information Technology for Village Economic Empowerment

The utilization of information technology plays a significant role in supporting rural economic empowerment through the strengthening of local economic institutions such as BUMDes. Integrating technology into village enterprise management enhances operational efficiency, expands market reach, and reinforces transparency and accountability. A web-based system enables village administrators to monitor business performance in a measurable manner and provides open access to information for the community. Moreover, the application of information technology encourages digital transformation in rural areas, creating an adaptive local economic ecosystem that aligns with modern developments and supports the vision of an independent and sustainable village.

Research Methodology

This study is an applied research employing a software engineering approach. The main objective is to develop a web-based application that can support the management of Village-Owned Enterprises (BUMDes) effectively, efficiently, and transparently. The focus of this research is not only on the development of the system but also on analyzing user requirements and implementing appropriate technology that fits the village context. The system development process follows the Waterfall model, which provides a structured and sequential framework for software development. This model was chosen because it allows clear documentation, systematic progress, and straightforward evaluation at each stage. The following diagram illustrates the adapted Waterfall model used in the development of the BUMDes Jati Sari web application, along with a description of each phase, its main activities, expected outputs (deliverables), and success criteria.

Waterfall Model Diagram

Design and Development of a Web-Based
BUMDes Application in Jati Sari Village

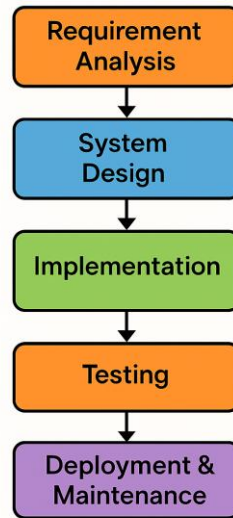


Figure 1. Waterfall System

Results

1. System Implementation

The web-based BUMDes application was developed using a client-server architecture with a backend built in PHP and a MySQL database, while the user interface was designed using HTML5, CSS (Bootstrap), and JavaScript. The system currently operates on a local server prepared for testing purposes and can be migrated to a cloud hosting environment when needed.

The main modules successfully implemented in the system include user management, financial management, savings and loan data, population data, inventory and product management, as well as reporting and analytical dashboards:

a. Dashboard Interface

The dashboard interface serves as the main page that appears when the system is first launched. It provides a summary of essential information such as the total number of users, financial transactions, active savings accounts, and the overall performance of BUMDes units. This dashboard is designed to help administrators and managers quickly monitor operational activities and make data-driven decisions.



Figure 2. Dashboard View

b. Vision and Mission Display

The Vision and Mission Display is a page that contains the vision and mission statements of Jati Sari Village. This page aims to provide users and the community with a clear understanding of the village's development goals and strategic directions.

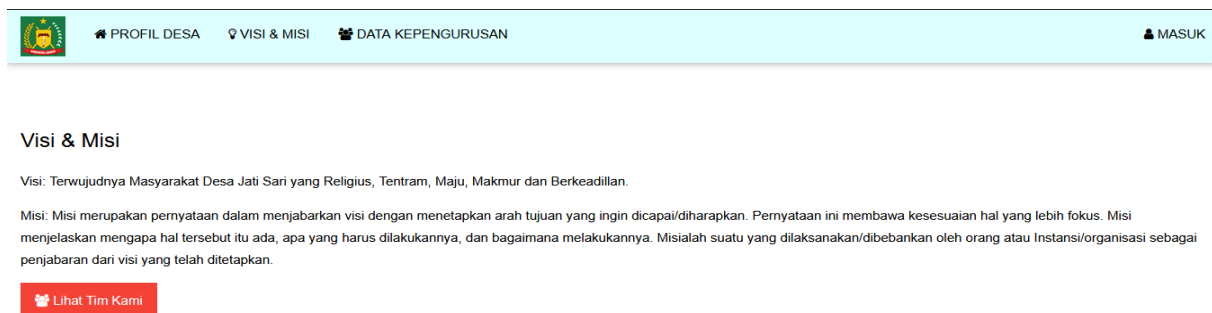


Figure 3. Village Vision and Mission View

c. Village Management Data Display

The Village Management Data Display is a page that contains information about the village officials, including their photos, names, and positions.

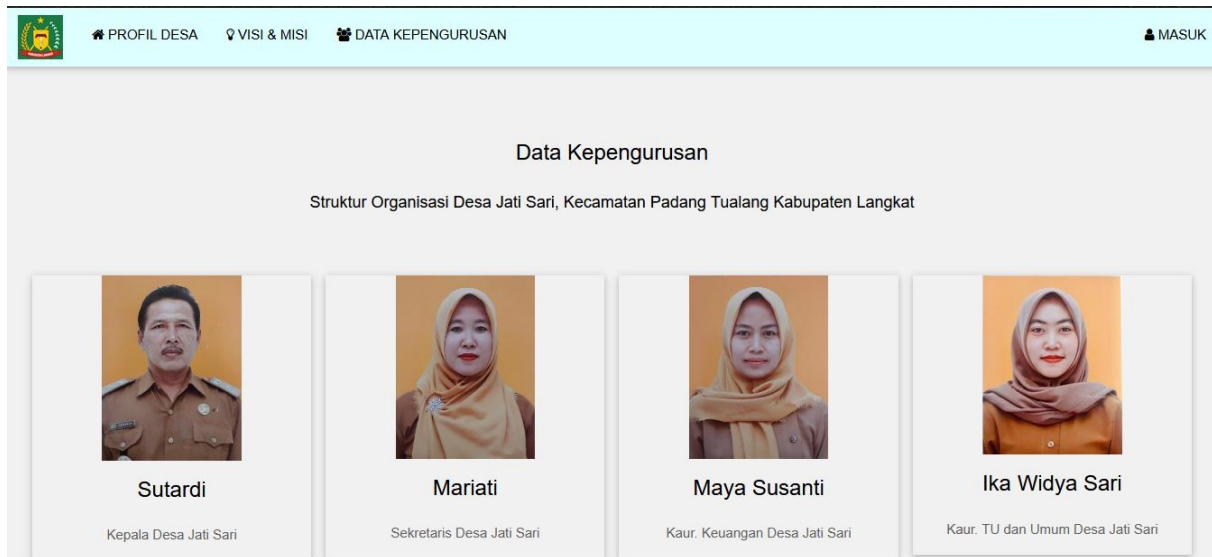


Figure 4. Management Data View

d. Login Page Display

The Login Page Display is a page that contains a login form used to access the BUMDes management system. Only authorized village officials with valid credentials are allowed to log into the system.

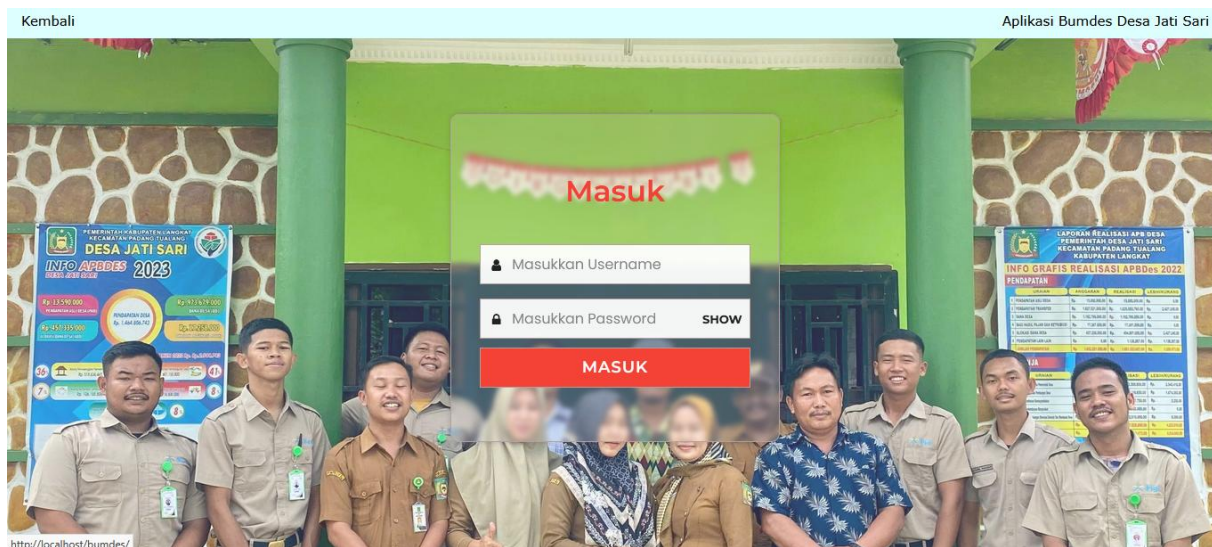


Figure 5. Login Menu View

e. Population Data Menu Display

The Population Data Menu Display is a page that contains detailed information about the residents of Jati Sari Village. This page is accessible only to village administrators (admin users) who have authorization to manage population records.

No.	Kode	Nama	Tanggal Masuk	Tempat Lahir	Tanggal Lahir	Pendidikan	Alamat	Jenis Kelamin	Pekerjaan	Nomor HP	Opsi
1	001	SRI HARTINI	16 Oktober 2025	Langkat	15 Oktober 1951	D2/D1/SMA	Dusun I Purwodadi	Wanita	Ibu Rumah Tangga	0829373333	Edit Hapus
2	002	SANTI RAHAYU	25 November 1902	Stabat	16 Oktober 2025		Dusun III Agung Sari	Wanita	Ibu Rumah Tangga	083018434343	Edit Hapus

Figure 6. Population Data Menu View

f. Savings Data Menu Display

The Savings Data Menu Display is a page that contains information about the residents' savings records within the BUMDes system. This page is restricted to village administrators (admin users) who are authorized to manage financial data.

No	Nomor Simpanan	Kode	Tanggal Simpanan	Simpanan Pokok	Simpanan Wajib	Simpanan Lain	Jumlah Simpanan	Opsi
1	S001	001	16 Oktober 2025	Rp. 800.000	Rp. 850.000	Rp. 0	Rp. 1.650.000	Edit Hapus

Figure 7. Savings Data Menu View

Conclusion

The design and development of a web-based BUMDes (Village-Owned Enterprise) application in Jati Sari Village, Padang Tualang District, Langkat Regency has successfully addressed various administrative and operational challenges previously faced by BUMDes management. The system was developed using the Waterfall development model with PHP technology and a MySQL database. The implementation results show that the developed system is capable of improving efficiency, transparency, and accessibility in BUMDes management. Through several main modules—such as user management, financial reporting, savings and loan data, population data, and service transactions—the application provides an integrated and structured platform to support village economic activities. Based on the results of functional and usability testing, all core features operate according to user requirements and achieve a high

level of user satisfaction and ease of use. The implementation of this system has a positive impact on the administrative performance of BUMDes by accelerating the reporting process, reducing data duplication, and increasing community trust in the transparency of village management. Furthermore, the adoption of a web-based system encourages digital participation among villagers and supports the digital transformation of rural economic governance. For future development, it is recommended that the system be equipped with additional features such as online payment integration, cloud-based automatic data backup, real-time notifications, and a more comprehensive analytical dashboard. With continuous improvement and broader implementation in other villages, this application has the potential to become a model for efficient, transparent, and sustainable digital-based village economic management in Indonesia.

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