p-ISSN 2407-4489
e-ISSN 2528-7303

Development of A Web-Based Information System for BUMDes eMHa in Melirang Village, Indonesia

Awwalur Rohmah Cahyaningati[a], Saffana Assani'[b], Muhamad Afif Effindi[c], Taufiqur Rohman[d]

[a, b, d] *Department of Informatics Engineering, Universitas Qomaruddin, Gresik, Indonesia*
[c] *Department of Informatics Education, Universitas Trunodjoyo Madura, Bangkalan, Indonesia*
email: [a] mayamanyus01@gmail.com, [b] saffanaassani09@gmail.com, [c] mafif.effindi@trunojoyo.ac.id, [d] taufiqurrohman@uqgresik.ac.id

Abstract

Indonesia's village-Owned Enterprises (BUMDes) play a strategic role in managing local resources to enhance the economic welfare of rural communities. However, limited access to information has led to low public awareness of their existence, business units, and development. This study aims to design and develop a web-based information system for the Melirang Hebat Village-Owned Enterprise (SIM BUMDes eMHa) as an effective medium for information dissemination and communication. The system was developed using the System Development Life Cycle (SDLC) with the Waterfall model, encompassing requirement analysis, system design, implementation, and testing. The results demonstrate that the proposed system is capable of delivering integrated information on organizational profiles, business units, news, and partnerships. Functional testing showed that all core features operated successfully according to the specified requirements. In addition, the system improved information accessibility and supported more efficient dissemination of BUMDes-related information to the community. The implementation of this system contributes to enhancing transparency, improving information accessibility, and fostering community participation in BUMDes development.

Keywords: BUMDes, information system, web-based system, SDLC, public service

p-ISSN 2407-4489
e-ISSN 2528-7303

INTRODUCTION

Village-Owned Enterprises (BUMDes) are village-level business entities established and managed collaboratively by village governments and local communities to support rural economic development. According to the Regulation of the Minister of Home Affairs Number 39 of 2010, BUMDes are formed through village deliberation processes to manage local economic potential and improve community welfare. The strategic role of BUMDes in strengthening rural economies is reflected in the rapid growth of these institutions, with more than 73,000 BUMDes currently operating across Indonesia (Mastersite, 2022) (*Data BUM Desa / BUM Desa Bersama*, 2026).

The advancement of information technology has encouraged digital transformation across various sectors, including village governance and public services. In this context, web-based information systems have become important tools for improving information accessibility, transparency, and service efficiency. Previous studies have reported that the implementation of digital systems in village administration and BUMDes management can improve data management, information dissemination, and organizational effectiveness (Faturahman et al., 2024; Ichsan et al., 2023; Lidjang et al., 2024; Ramadani et al., 2025; Sidiq et al., 2025; Siman & Wiratama, 2023; Wayahdi & Guntur, 2025).

BUMDes eMHa, established in Melirang Village, Indonesia, plays an important role in supporting local economic activities through several business units with considerable development potential. However, information dissemination regarding organizational activities, business units, and partnerships is still conducted conventionally, limiting public access to updated information. As a result, community awareness and understanding of the available services and business potentials remain limited.

Although previous studies have discussed the implementation of web-based systems in village administration and BUMDes management, most of them primarily focused on administrative services and technical implementation (Faqih & Widya, 2023; Manehat et al., 2025; Nuraini & Paramitalaksmi, n.d.; Rahmatika et al., 2026; Sudiatmika et al., 2024). Limited studies have specifically developed an integrated information system that combines organizational profiles, business unit promotion, partnership information, and public accessibility within a single platform for BUMDes. Therefore, this study addresses this gap by developing a web-based information system tailored to the needs of BUMDes eMHa in Melirang Village.

This study aims to design and develop the BUMDes eMHa Information System (SIM BUMDes eMHa) as a web-based platform for information dissemination and communication. The proposed system integrates organizational information, business unit promotion, news, and partnership information into a single accessible platform. The novelty of this study lies in the development of an integrated information system specifically designed to support transparency, information accessibility, and digital communication within village-owned enterprises. In addition, this study contributes practically and academically by providing a model for implementing digital information systems to support the digital transformation of BUMDes.

METHODS

The system was developed using the System Development Life Cycle (SDLC) methodology with the Waterfall model. The Waterfall approach is considered suitable for projects with relatively small-scale development environments and clearly defined system requirements (Haniva et al., 2023). The SDLC consists of five sequential phases: requirements analysis, system design, implementation, testing, and maintenance. In this model, each development phase must be completed before proceeding to the next phase, as the process follows a structured and linear sequence to ensure systematic system development. The stages of the Waterfall model are illustrated in Figure 1. This model was selected due to its systematic and structured phases, making it appropriate for information system development with stable and well-defined requirements. In the context of this study, the system requirements were identified at the initial stage through direct observations and interviews with BUMDes eMHa

p-ISSN 2407-4489
e-ISSN 2528-7303

stakeholders, enabling a sequential development process with minimal requirement changes during implementation.

Compared to iterative development approaches such as Agile, the Waterfall model was considered more suitable for this study due to the relatively limited project scope, clearly identified requirements, and structured administrative environment of village-level institutions. Agile methodologies generally require continuous user involvement and iterative revisions throughout the development process, whereas the Waterfall model provides a more controlled and predictable development framework for projects with stable requirements and limited technical resources.

Data collection was conducted through direct observation and semi-structured interviews with BUMDes eMHa administrators and stakeholders. Observation was carried out to identify the existing information management process and operational workflow within the organization. Meanwhile, interviews were conducted to gather system requirements, identify organizational challenges, and determine user needs related to information dissemination, transparency, and public accessibility.

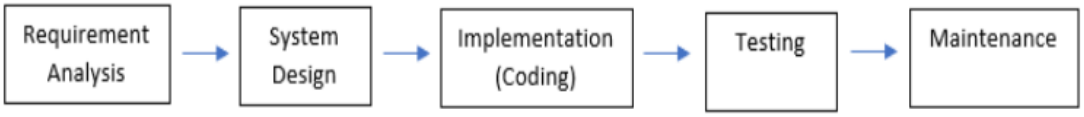


Figure 1. SDLC Phases

The stages of the Waterfall model applied in this study are described as follows:

(1) Requirements Analysis
At this stage, system requirements were identified through observations and interviews with BUMDes eMHa management. The analysis included both functional and non-functional requirements needed for system development.

(2) System Design
This phase involved designing the system architecture, user interface, and database structure using Unified Modeling Language (UML), Conceptual Data Model (CDM), and Physical Data Model (PDM).

(3) Implementation
The system was developed using PHP as the programming language and MySQL as the database management system. The application was implemented as a web-based information system.

(4) Testing
System evaluation was conducted using functional testing and user acceptance testing (UAT). Functional testing was performed to ensure that all system features operated according to the specified requirements without critical functional errors. In addition, user acceptance testing involved BUMDes administrators to evaluate system usability, accessibility, and suitability for organizational information management and public information dissemination.

(5) Maintenance
This phase ensured that the system operated effectively after deployment and could be further developed in accordance with evolving organizational and user needs.

RESULTS AND DISCUSSION

This study produced three main outputs: system requirements analysis, system design, and system implementation. The requirements analysis is categorized into functional and non-functional requirements, which serve as the foundation for system development. The system design phase is divided into two main components: system modeling and database design. System modeling is

p-ISSN 2407-4489
e-ISSN 2528-7303

represented using Unified Modeling Language (UML) to illustrate system functionality and user interactions, while database design is developed using the Conceptual Data Model (CDM) and Physical Data Model (PDM) to ensure data consistency and structural integrity. These design artifacts provide a comprehensive blueprint that guides the implementation of the web-based information system.

3.1. System Analysis

The system analysis document consists of functional and non-functional requirements. Functional requirements define the set of functions that must be provided by the system. The system involves two types of end users; therefore, the functional requirements are categorized into those for administrators and those for general users.

An administrator is a user who has full access to manage all system components, whereas general users are individuals who access and utilize the available system features. Data management within the Melirang Hebat Village-Owned Enterprise Information System (SIM BUMDes eMHa) includes data input, deletion, modification, and updating processes. The administrative interface provides the following main features:

1. **Home Menu**, which includes background display, chairman's message, gallery, staff profiles, news, and BUMDes eMHa partnerships.
2. **Profile Menu**, which includes organizational history, vision and mission, and organizational structure.
3. **Business Unit Menu**, which presents information on the business units managed by BUMDes eMHa.
4. **About Menu**, which provides address and contact information of BUMDes eMHa.

Non-functional requirements refer to system characteristics and constraints. In this study, non-functional requirements are classified based on user roles, namely administrators and general users:

Administrator:

1. Requires internet connectivity to access the system.
2. Requires system security to ensure safe data storage.
3. Requires training or socialization prior to utilizing system features.

General Users:

1. Require internet connectivity to access the system.
2. The system must be accessible to all users, including both local residents and external audiences.

3.2. System Design

The system design in this study is developed using the Unified Modeling Language (UML) to represent system structure and interactions. One of the primary UML diagrams utilized is the Use Case Diagram, which illustrates the interactions between users and the system, as well as the system's functional requirements. The use case diagram provides a visual representation of user activities and system processes. The corresponding diagram is presented in Figure 2.

Depicted in Figure 2, after logging into the system, the administrator is able to manage four main menus: Home, Profile, Business Units, and About. Within the Home menu, the administrator can manage several components, including the background display, chairman's message, gallery, staff information, news, and partnerships. Through the Profile menu, the administrator is also able to manage organizational history, vision and mission, as well as the organizational structure.

Depicted in Figure 3, visitors can access the main menus, namely Home, Profile, Business Units, and About. In addition, visitors can navigate through submenus within the Home menu, including the background display, chairman's message, gallery, staff information, news, and partnerships. Within the Profile menu, visitors can also access submenus such as organizational history, vision and mission, and organizational structure.

p-ISSN 2407-4489
e-ISSN 2528-7303

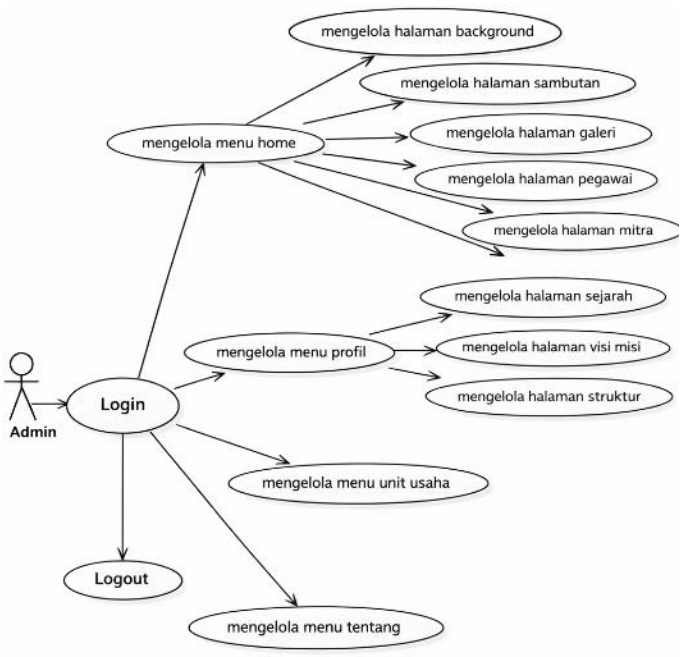


Figure 2. Admin Use Case Diagram

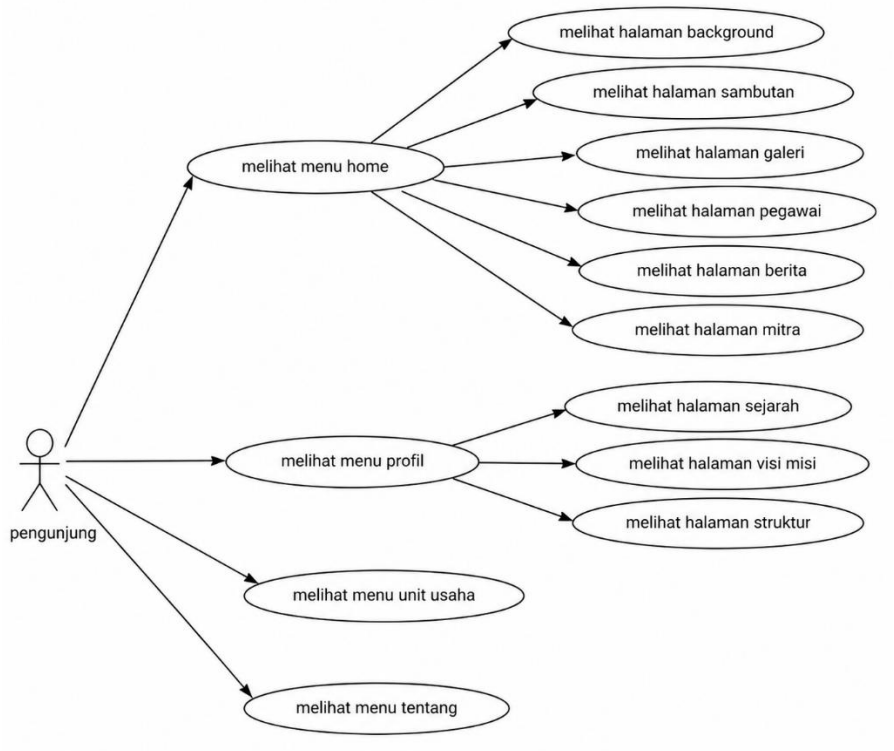


Figure 3. Visitor Use Case Diagram

The database design in this study is developed using the Conceptual Data Model (CDM) and Physical Data Model (PDM). The CDM is employed to represent the conceptual structure of the database for the BUMDes eMHa information system, enabling the identification of required entities and tables. In constructing the CDM, data stores derived from the Data Flow Diagram (DFD) are utilized as the basis for modeling. The CDM of the BUMDes eMHa information system is presented in Figure 4.

p-ISSN 2407-4489
e-ISSN 2528-7303

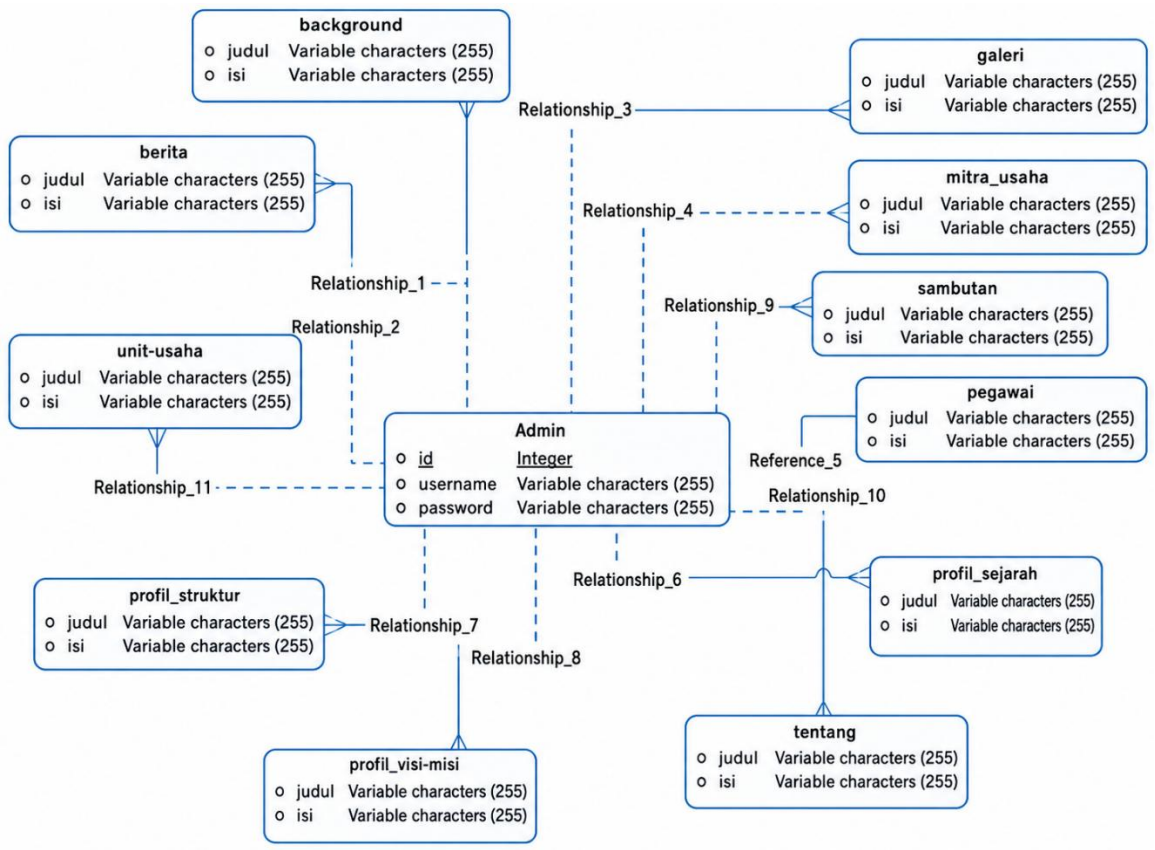


Figure 4. Conceptual Data Model

The Physical Data Model (PDM) is a data model consisting of a set of tables used to represent data and the relationships among them. Each table contains multiple columns, where each column is defined by a specific data type and a unique identifier. The PDM represents the physical design of the database, enabling its direct implementation within a database management system. The PDM of the BUMDes eMHa information system is presented in Figure 5.

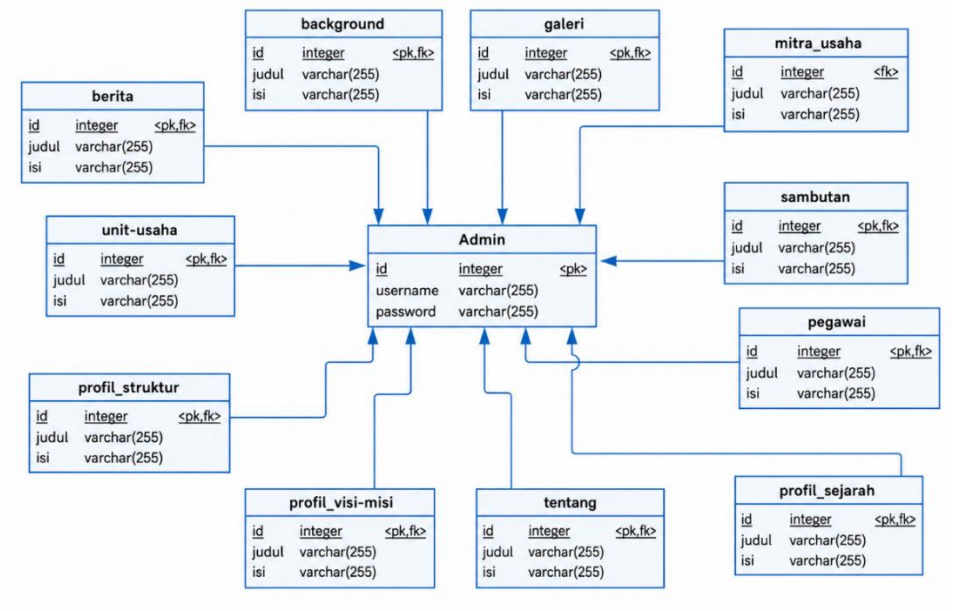


Figure 5. Physical Data Model

p-ISSN 2407-4489
e-ISSN 2528-7303

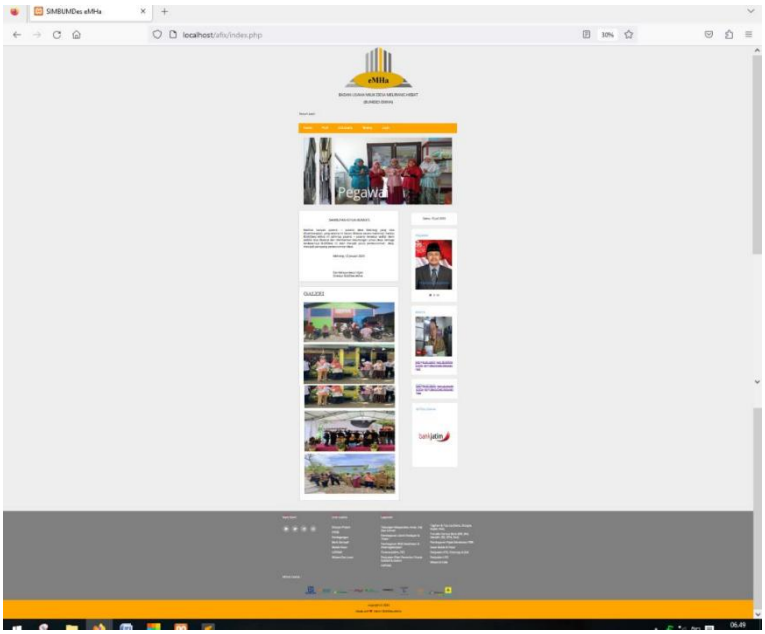


Figure 6. User Interface of the Melirang Village-Owned Enterprise Information System (Visitor View)

3.3. System Implementation

The implementation of the Melirang Village-Owned Enterprise information system, developed using PHP as the programming language and MySQL as the database management system, is described as follows. The system consists of several main menus (Figure 6), including the Home menu, Profile menu, Business Units menu, About menu, and an administrative login menu. The Home menu serves as the main interface and includes the enterprise logo, enterprise name, motto, navigation menu, background display, gallery page, welcome message, calendar, news section, partnership information, and footer. The Profile menu provides organizational information, while the Business Units menu presents details of the enterprise's business activities. The About menu contains general information, including location and contact details. Additionally, the login menu is designed specifically for administrators to manage system content.

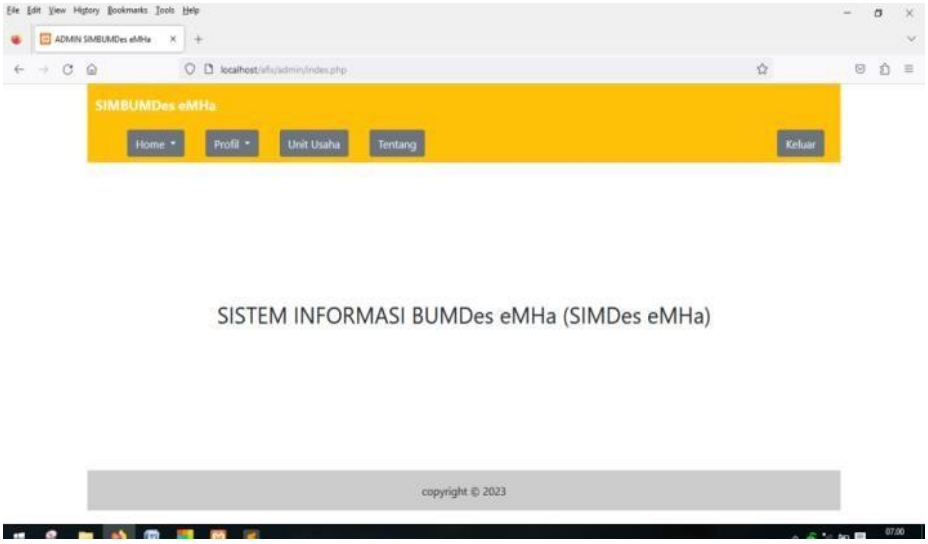


Figure 7. Administrative Interface of the Melirang Village-Owned Enterprise Information System

p-ISSN 2407-4489
e-ISSN 2528-7303

The administrative interface consists of several main components, including the dashboard, Home menu, Profile menu, Business Units menu, About menu, and logout function. The dashboard provides navigation to key menus such as Home, Profile, Business Units, About, and Logout. The Home menu enables administrators to manage content through functions such as adding, deleting, updating, and modifying data related to the background display, news, gallery, staff information, partnerships, and welcome message. The Profile menu provides similar management functionalities for organizational history, vision and mission, and organizational structure. The Business Units menu allows administrators to manage data related to the enterprise's business units, including adding, deleting, updating, and modifying information. The About menu facilitates the management of general organizational information, including content updates and modifications. Finally, the logout function allows administrators to securely exit the system.

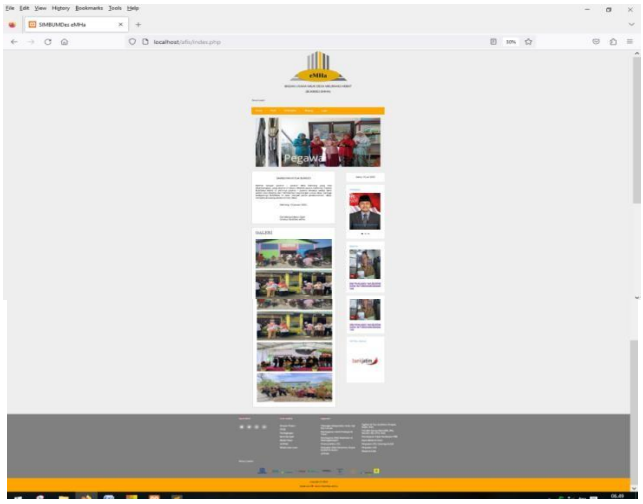


Figure 8. Home Page of the Melirang Village-Owned Enterprise Information System

The Home menu serves as the main landing page when visitors access the BUMDes eMHa website. This page contains the main background display, welcome message, gallery, calendar, staff information, news section, partnership information, and footer.

The background section displays selected images featured on the main page. The welcome section contains an introductory message from the head of BUMDes eMHa. The gallery section presents images accompanied by descriptions of activities and work programs carried out by BUMDes eMHa. The staff section provides information on personnel, including their photographs and positions, and is presented in a scrollable or slider format. The news section includes media coverage related to BUMDes eMHa.

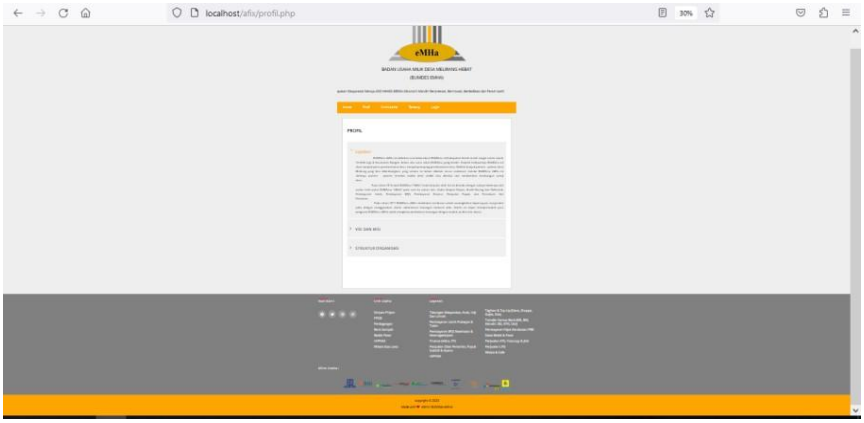


Figure 9. Profile Page of the Melirang Village-Owned Enterprise Information System

p-ISSN 2407-4489
e-ISSN 2528-7303

The Profile menu represents the organizational profile of BUMDes eMHa. This section includes information on the organization's history, vision and mission, and organizational structure. The history page outlines a brief background of the establishment of BUMDes eMHa, while the vision and mission page describes its strategic goals. The organizational structure page presents the hierarchy and roles within the organization.

The Business Units menu represents the section dedicated to the business activities of BUMDes eMHa. This page provides information on the types or sectors of business units managed by the enterprise. When a specific business unit is selected, the system displays a brief description of the business type along with the services offered by BUMDes eMHa. This feature supports the promotion of local economic activities and enhances public understanding of the services provided by the enterprise, thereby contributing to increased community engagement and economic participation.

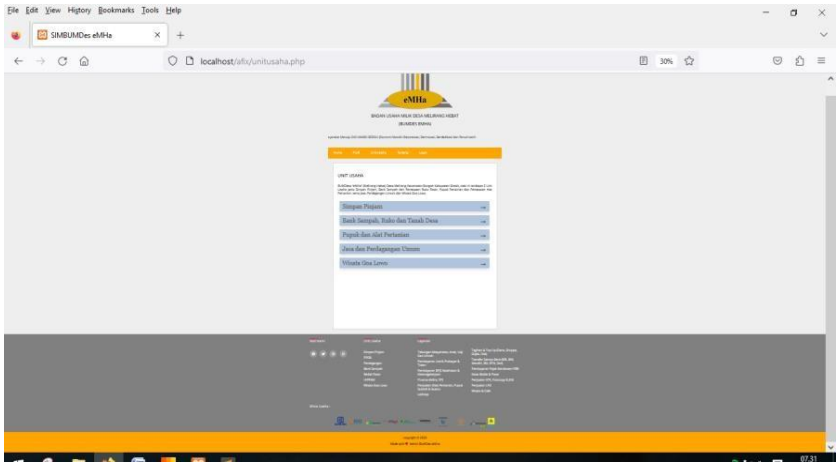


Figure 10. Business Units Page of the BUMDes eMHa Information System

The About menu represents the section that provides general information about BUMDes eMHa. This page includes a brief description of the establishment of the enterprise, its location, as well as contact information and social media links. This feature enhances information accessibility and supports transparency by enabling the public to easily obtain essential organizational details. The footer section provides information on services, partnerships, and the official social media of BUMDes eMHa, as well as details related to the development of the website. This section supports transparency and facilitates access to essential information for users.

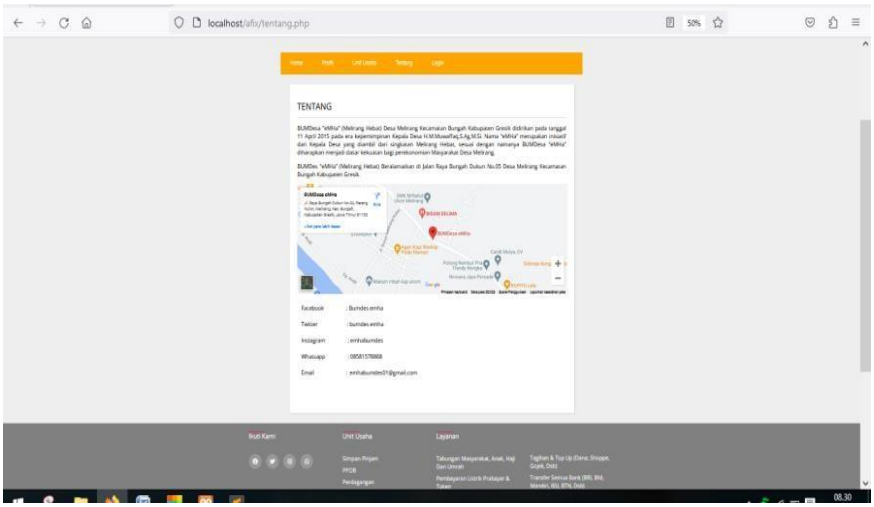


Figure 11. About Page of the BUMDes eMHa Information System

p-ISSN 2407-4489
e-ISSN 2528-7303

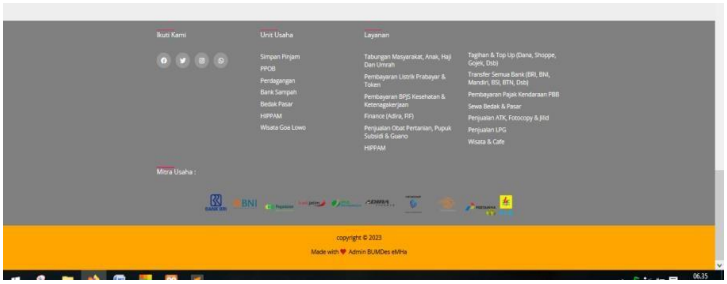


Figure 12. Footer Section of the BUMDes eMHa Information System (Visitor View)

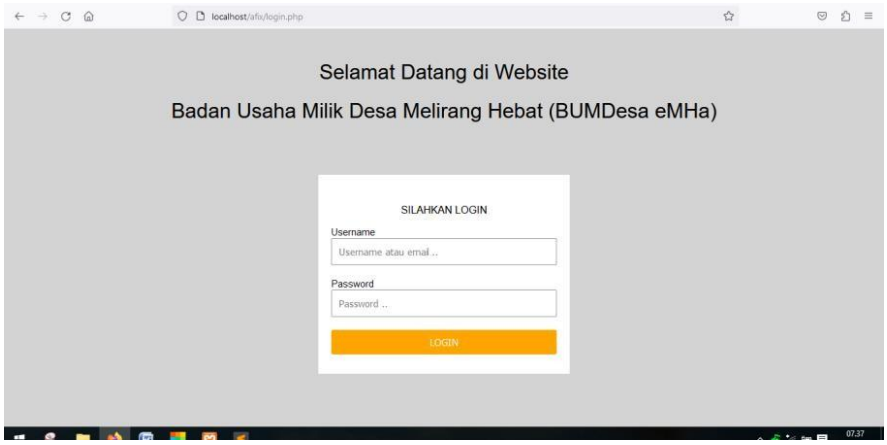


Figure 13. Admin Login Page of the BUMDes eMHa Information System

The login menu directs users to the administrator login page of BUMDes eMHa. Access to this page is restricted, as authentication credentials are exclusively assigned to authorized administrators, ensuring system security and data integrity. General visitors are limited to accessing publicly available information without login privileges. Through this interface, administrators are able to perform content management operations, including adding, updating, modifying, and deleting data within the system.

The administrator's main dashboard provides access to key system modules, including Home, Profile, Business Units, About, and a logout function. The Home module consists of several submodules, including background, news, gallery, staff information, partnerships, and welcome message.

Each submodule supports comprehensive content management operations, such as creating, updating, modifying, and deleting data. This modular structure enables efficient and centralized management of system content, ensuring consistency and ease of maintenance across different information components.



Figure 13. Administrator Dashboard Interface of the BUMDes eMHa Information System

p-ISSN 2407-4489
e-ISSN 2528-7303

Within the staff, partnerships, and welcome message modules, administrators can perform comprehensive content management operations, including creating, updating, modifying, and deleting data. These features support dynamic information management and ensure that organizational content remains accurate and up to date. The Profile module is structured into three main components: history, vision and mission, and organizational structure. Each component allows administrators to manage content through standardized operations, promoting consistency and ease of maintenance across the system. Likewise, the Business Units module enables administrators to manage enterprise-related information efficiently, supporting accurate representation of business activities and services. This modular and standardized design enhances system usability, maintainability, and data consistency.

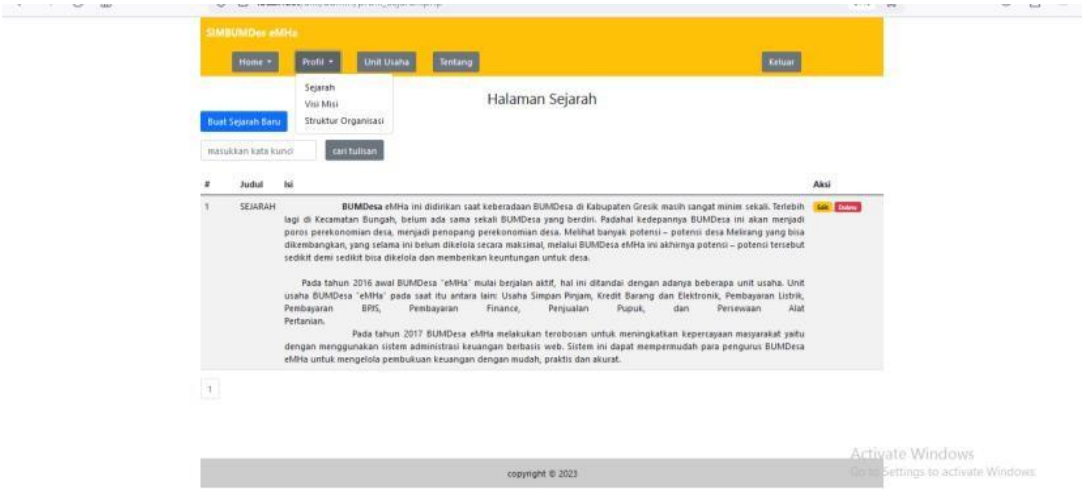


Figure 14. History Page of the BUMDes eMHa Information System

Within the About module, administrators can perform comprehensive content management operations, including creating, updating, modifying, and deleting data. The logout function enables administrators to securely terminate their session and redirect to the public-facing interface, ensuring that all updated content is immediately reflected and accessible to users.

3.4 System Evaluation and Discussion

Table 1. System Functional Testing Result

System Feature	Testing Result
Login System	Successful
Profile Management	Successful
News Management	Successful
Gallery Management	Successful
Business Unit Information	Successful
Partnership Information	Successful

The system effectively supported organizational information management, business unit information dissemination, partnership management, and public accessibility without critical functional errors. Based on user acceptance testing conducted with BUMDes administrators, the developed system improved the efficiency of information dissemination and simplified content management activities compared to the previous conventional approach. The implementation of the web-based platform also increased accessibility to organizational information for the community.

These findings are consistent with previous studies which reported that web-based information systems can improve transparency, accessibility, and organizational effectiveness in village governance and BUMDes management (Faqih & Widya, 2023; Siman & Wiratama, 2023). However, this study

p-ISSN 2407-4489
e-ISSN 2528-7303

specifically contributes by integrating organizational profiles, business unit promotion, partnership information, and public accessibility into a single web-based platform tailored to the operational needs of BUMDes eMHa.

CONCLUSION

This study demonstrates that the development of a web-based information system for BUMDes eMHa provides a structured and effective solution for managing and disseminating organizational information. The developed system integrates key information components, including organizational profiles, business units, news, and partnership information, into a unified platform that improves accessibility and usability for the community. Functional testing and user acceptance evaluation indicated that the system operated according to the specified requirements and supported more efficient information dissemination and organizational information management.

The findings of this study indicate that the implementation of web-based information systems can support not only information dissemination but also organizational transparency, digital communication, and community engagement within village-owned enterprises. The integration of multiple information services within a single platform demonstrates the potential of digital systems to strengthen governance and support sustainable rural economic development.

Practically, the developed system can serve as a reference model for other BUMDes or village-level institutions seeking to implement digital information systems to improve public accessibility, transparency, and information management efficiency. Academically, this study contributes to the growing body of research on digital transformation and web-based information systems in rural institutions, particularly in the context of BUMDes management and public information services.

This study is limited to the development and implementation of the system within a single BUMDes environment. In addition, the evaluation process mainly focused on functional testing and user acceptance testing involving internal administrators without large-scale quantitative usability assessment. Future research may focus on integrating additional features such as financial transaction management, mobile-based accessibility, and broader usability evaluation involving larger groups of users to further improve system effectiveness and user experience.

REFERENCES

Faqih, A. R., & Widya, A. A. (2023). Implementasi Aplikasi E-Ticket pada Bumdes Desa Sumbermulyo Kec. Jogoroto Kab. Jombang sebagai Solusi Digitalisasi Pengelolaan Tiket. *Jurnal Sistem Informasi, Teknik Informatika dan Teknologi Pendidikan*, *2*(2), 49–54. https://doi.org/10.55338/justikpen.v2i2.30

Faturahman, D., Jamaludin, I., & Suwarno, A. (2024). Web-Based Village Information System Design (Study At One of The Villages in West Java). *Informatics Management, Engineering, and Information System Journal*. https://jurnal.stmik-mi.ac.id/imeisj/article/download/109/352

Haniva, D. T., Ramadhan, J. A., & Suharso, A. (2023). Systematic Literature Review Penggunaan Metodologi Pengembangan Sistem Informasi Waterfall, Agile, dan Hybrid. *Journal of Information Engineering and Educational Technology*, *7*(1), 36–42. https://doi.org/10.26740/jieet.v7n1.p36-42

Ichsan, Feri Susilawati, & Muhammad Haykal. (2023). Design and Build a Web-Based Village Information System for Acceleration of Village Services in Gampong Jantho Makmur. *Jurnal Inotera*, *8*(1), 155–161. https://doi.org/10.31572/inotera.Vol8.Iss1.2023.ID233

Lidjang, A. K., Rada, Y., & Sitaniapessy, D. A. (2024). Design of a Web-Based Village Asset Information System in Waimbidi Village. *MALCOM: Indonesian Journal of Machine Learning and Computer Science*, *4*(2), 423–432. https://doi.org/10.57152/malcom.v4i2.1191

p-ISSN 2407-4489
e-ISSN 2528-7303

Manehat, D. J., Tedy, F., Mau, S. D. B., & Siki, Y. C. H. (2025). *Peningkatan Penjualan Produk UMKM Pada Bumdesma Amarasi Barat Melalui Implementasi Dan Pendampingan Penggunaan E-Commerce*. *6*(2).

Mastersite. (2022, December 14). *Bumdes | BumDesa*. https://bumdesa.id/bumdes/

Nuraini, R. I., & Paramitalaksmi, R. (n.d.). *Implementasi Sistem Informasi Akuntansi dalam Meningkatkan Transparansi Pengelolaan Laporan Keuangan BUMDes Panggung Lestari di Desa Panggungharjo*.

Rahmatika, N., Widyaningsih, B., Mawardi, I., Alfirdaus, A. I., Fath, M. N., Suja, S., Azhari, M. R. H., & Kusuma, A. A. (2026). Perancangan dan Pengimplementasian Website Penjualan BUMDES Dalam Uapaya Penerapan Teknologi Dalam Bidang Perekonomian Di Desa Sumberagung. *Archive: Jurnal Pengabdian Kepada Masyarakat*, *5*(2), 365–375. https://doi.org/10.55506/arch.v5i2.168

Ramadani, R. A., Wirawan, R., & Syam, N. (2025). DEVELOPMENT OF WEB-BASED VILLAGE INFORMATION SYSTEM AT TUGONDENG VILLAGE OFFICE. *Journal Informatika, Multimedia, and Infomation*, *3*(1), 58–70. https://doi.org/10.61912/lajutek.v3i1.134

Sidiq, H. H., Junarto, R., & Wahyuni, W. (2025). Web-Based Village Land Information System Development for Optimizing Regional Land Administration. *International Journal of Advances in Data and Information Systems*, *6*(1), 46–61. https://doi.org/10.59395/ijadis.v6i1.1360

Siman, K. F., & Wiratama, J. (2023). A Web-based Village Administrative Information Systems fo Improvement Quality of Service towards Smart Village Concept. *G-Tech: Jurnal Teknologi Terapan*, *7*(4), 1519–1528. https://doi.org/10.33379/gtech.v7i4.3196

Sudiatmika, I. P. G. A., Ni Wayan Cahya Ayu Pratami, & Imbayani, I. G. A. (2024). Transformasi Menuju Desa Digital: Pemberdayaan BumDes Melalui Inovasi Manajemen Keuangan dan Implementasi IOT di Bum Desa Panca Laksmi Sedana Abuan Bangli. *Jurnal Abdimas Indonesia*, *4*(3), 1068–1082. https://doi.org/10.53769/jai.v4i3.948

Wayahdi, M. R., & Guntur, S. (2025). Website-Based Village Information System Design (Case Study: Ujung Batu III Village). *Jurnal Minfo Polgan*, *14*(1), 38–44. https://doi.org/10.33395/jmp.v14i1.14621