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Web-based Panggung Lestari Village-Owned Enterprises (BUMDES) Integrated Service Information System

Vicky Fidiantoro[1,*], Rianto[2], Puji Handayani Putri[3]
[1,3]Department of Informatics, Universitas PGRI Yogyakarta, Daerah Istimewa Yogyakarta, Indonesia

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ABSTRACT

Village-Owned Enterprises (BUMDes) are village business institutions whose businesses are run by village communities and the village government to improve village welfare. BUMDes was formed as a business institution that can manage various businesses according to the needs and potential of the village. However, BUMDes face challenges in managing their business, such as recording transactions and reports. The lack of data integration between business units is a problem for BUMDes in monitoring their businesses. This research is to design and implement a website-based BUMDes integrated service information system at BUMDes Panggung Lestari. This system design uses a programming language PHP with framework *codeigniter* and database *MySQL*. The system development method used is SDLC (System Development Life Cycle) model waterfall. By integrating data between BUMDes Panggung Lestari business units, it makes it easier for BUMDes to manage, monitor and supersive their businesses efficiently in one system. This system is designed to include features for recording income transactions and business operational costs, as well as providing reports that can be used for analysis and evaluation of operational performance and providing information services features to the public regarding information about BUMDes.

Corresponding Author:

Vicky Fidiantoro,
Department of Informatics
Universitas PGRI Yogyakarta,
Jl. PGRI 1 Sonosewu No.117, Daerah Istimewa Yogyakarta 55182, Indonesia.
Email: *vickyfidiantoro94@gmail.com

1. INTRODUCTION

Village-Owned Enterprises (BUMDes) are village businesses managed by the Village Government and have legal entity status. The Village Government has the authority to establish BUMDes based on the needs and potential of the village. BUMDes management involves the village government and village community. BUMDes was formed based on the needs and potential that exist in the village [1]. BUMDes Panggung Lestari was founded by the Village Government of Panggungharjo, Sewon, Bantul, D.I. Yogyakarta in 2013 through Panggungharjo Village Regulation Number 7 of 2013 concerning the formation of Panggung Lestari Village-Owned Enterprises (BUMDes). The aim of establishing this BUMDes is to utilize village potential while simultaneously driving the economy of the Panggungharjo Village community [2]. Currently BUMDes Panggung Lestari has four business units, namely KUPAS, Kampoeng Mataraman, Pasardesa.id Panggungharjo, and The Ratan. Establishment of Panggung Lestari Village-Owned Enterprises (BUMDes) to increase Village Original Income [1].

The variety of business units managed by BUMDes makes it a challenge in itself to improve the quality of management of each business unit. The data management process for BUMDes Panggung Lestari business units is still manual *Ms.excel*, this becomes ineffective and unsystematic. To face these challenges, the use of information and communication technology is an effective solution. The existence of Information and Communication Technology (ICT) can not only improve services, but also provide benefits in data processing, which is useful for development planning, supporting decision making, and various other benefits. Information technology that is developing rapidly today is application and internet-based technology that allows access

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from anywhere. With this technology, data entry can be done from various locations and can be managed and monitored from one place as a control center [3]. The use of information technology in today's agencies is very important because it can make it easier to process data into useful information for users. The use of technology also allows agencies to access information quickly, precisely and effectively. This easy access to information related to BUMDes makes BUMDes develop in a better direction [4].

Previous research has discussed the use of information technology by designing information system in organizations, which contributes significantly to increasing operational efficiency and decision making. Previous research on designing a Mobile Web-Based Village-Owned Enterprise Information System (BumDes). This research is to design a Village-Owned Enterprise Information System (BUMDes) that can facilitate access to information and improve services in business marketing managed by BUMDes in Sidokayo Village. To design the system, researchers used the Extreme Programming method [5]. Previous research was also related to designing Web-based Information Systems at BUMDes institutions. This research aims to develop a website-based information system for Village-Owned Enterprises, which will make it easier for BUMDes administration to provide business-related services in Bumisari Village, as well as make it easier for the community to search for and obtain information regarding permits and business cooperation in the village. This system also provides information regarding the vision and mission, organizational structure, and the organization's governing body [6]. Other research on Designing Web-Based Information Media Facilities in Klambir Lima Village Using the Waterfall Method. This research is to develop a website-based Information System for Klambir Lima Kebun Village to improve services to the community. This system makes it easier to access information regarding village potential, population, area and others. Developed using the waterfall method, this system is expected to make it easier for people to access information accurately and support the achievement of village development [7].

Technological developments have provided many conveniences. The integration of computer technology with telecommunications has created a revolution in the field of information systems [8]. An information system can be defined as a series of organizational procedures which, when executed, will produce information that is useful for decision making or information control [9]. Various previous studies have made significant contributions regarding the benefits of using information technology, especially in increasing efficiency, speeding up access to information, and supporting decision making in various sectors. This research aims to design and implement a web-based integrated service information system at BUMDes Panggung Lestari which can make it easier for BUMDes to manage, monitor and supervise BUMDes business activities. The existence of an integrated BUMDes service information system is expected to make it easier for the public to access information services about BUMDes Panggung Lestari.

2. METHODOLOGY

2.1. Literature review

Research [8] entitled "BUMDes Mukti Bersama Information System" aims to design a web-based information system to speed up business records in BUMDes Mukti Bersama. By using the prototyping development method, this research produces a system that integrates data from three business units and is able to produce financial reports quickly and accurately.

Resarch [6] entitled "Design and Build a Web-Based Village Enterprise Information System (BUMDES)" aims to build a web-based information system for BUMDes. Through the stages of needs analysis, design, implementation and testing, this system makes it easier to manage businesses digitally and facilitates the community in borrowing and repayment at BUMDes Bumi Sari, while providing information about the vision, mission, structure and management of the organization.

Research Afandi et al [5] Designing an information system for Village-Owned Enterprises (BUMDes) in Sidokayo Village based on mobile web was carried out using the Extreme Programming method and the PHP programming language. This system is designed to facilitate access to information and improve services in marketing businesses managed by BUMDes in Sidokayo Village.

Research by Qur'ani Awaliyana and Ali Ikhwan [4] aims to develop a lending and payment application for BUMDes Perkebunan Bandar Telu using the R&D and development of the Waterfall system. This application makes it easier for BUMDes to manage loan data, search for loan history, and allows members to access data and installment schedules via Android devices.

Research [10] designed a Java-based scaffolding rental information system at UD Kian Ayu. The aim is to make it easier to collect data on rentals, returns, availability of goods, as well as produce more efficient and accurate reports. This system uses Java desktop and MySQL to improve the accuracy of data processing and report quality at UD Kian Ayu.

2.2. Data Collection Technique

Data collection aims to obtain the information needed to achieve research targets [11]. The data collection process starts from interviews for needs analysis, then continues to the testing stage by collecting information

through the use of questionnaires. Interviews are a data collection method carried out by means of direct questions and answers with sources to obtain data or information. This method is carried out with related parties to collect accurate and relevant data, so that it can produce clear system requirements [12]. Observation is a data collection method carried out through direct observation of the object being studied. At the data collection stage using a questionnaire, this questionnaire is applied during testing of the system that has been created. The purpose of collecting data through questionnaires is to evaluate the feasibility of the system and determine the extent to which the system was successful when tested [13]. This research involved 20 respondents who used the information system that had been created, then provided assessments through questionnaires. Evaluation covers three main aspects: information quality, system quality, and user satisfaction.

2.3. Software Engineering Method

The software development method used in designing this system uses System Development Life Cycle (SDLC). SDLC is a system or software development life cycle which is a general methodology that is often used in the process of developing software [14]. Information system development requires methods to form a framework in accordance with the developer's plans. Choosing the right SDLC model plays an important role in determining quality, cost, and other requirements in the system development process [15]. The Waterfall Model (shown in Figure 1) is a model in SDLC that is often applied in the development of information systems or software. This model uses a systematic and sequential approach starting from needs analysis (requirement analysis), system design (system design), implementation, testing, to maintenance (maintenance) [14], [15].

Figure 1. Waterfall Method Source: [14]

a. Concept Planning (Requirements Analysis)
   This stage involves analysis to understand customer needs through direct interviews with stakeholders. The result of this process is a system requirements analysis which includes development requirements and software specification documentation.
b. System modelling (System Design)
   At this stage, the system requirements analysis that has been previously created is translated into a system design, which will then be used as a basis for the coding process.
c. Implementation
   At this stage, a coding process is carried out using a programming language to convert the system design into an application.
d. Testing
   At this stage, system testing is carried out to evaluate performance and level its optimization, ensuring that all functions run as expected.
e. Maintenance
   At this stage, maintenance is carried out to repair damage to the system and ensure the system functions properly and meets user needs.

2.3.1. Requirement Analysis

At this stage, analysis is carried out to understand user needs or requests. Data collection is usually carried out through direct interviews with BUMDes. The result of this analysis is the identification of all requirements related to software development, as well as system requirements specifications which are documented in detail regarding software development requirements. Analysis of software requirements that support the creation of this system includes Windows 10 as the operating system, Xampp, Visual Studio Code, Google Chrome, and Dbeaver.

2.3.2. System Design

At this stage, the system requirements analysis that has been prepared previously is converted into a system design, which will then be used as a basis for the coding process. This stage requires design or plan to develop a system, including database design, interface display, software architecture, and coding procedures [16]. This research uses Context Diagrams, Data Flow Diagrams (DFD), and Entity Relationship Diagrams (ERD) as design models for system design.

2.3.3. Implementation

At this stage, a coding process is carried out to convert the system design into a runnable application. Writing program code is the stage where the system design that has been created is translated into commands that can be understood by a computer, using a programming language [17]. The coding process for this web-based application uses a programming language PHP with Framework CodeIgniter and MySQL databases.

2.3.4. Testing

At this stage, the system that has been developed is then tested. The purpose of this testing is to ensure that the new system runs without obstacles or problems when implemented. System testing uses black-box testing. Black box testing is a testing method that focuses on testing predetermined functional specifications, without examining the program design or coding [16].

2.3.5. Maintenance

At this stage, system maintenance is carried out when damage or problems are found. Maintenance includes error fixes, system updates, and configuration adjustments to ensure system performance remains optimal and meets user needs. This stage aims to ensure that the system can operate for a long period of time. System maintenance must be carried out routinely and on a schedule to detect and overcome deficiencies or weaknesses in the system as quickly as possible [16].

3. RESULTS AND ANALYSIS

3.1. Requirements Analysis System

After the data collection stage, the next step is to carry out a system requirements analysis. This stage is identifying the needs of the system to be designed. Table 1 provides information about the system features needed to design a web-based BUMDes integrated service information system.

Table 1. System Requirements Analysis

No	System Features	Description
1	User Management	Management of system user access rights.
2	News Management	Management of BUMDes news information data
3	HR Management	BUMDes employee data management
4	Transaction Management	Recording business income transactions and business operational cost transactions
5	General Services	Providing information related to BUMDes for the public (society)
6	Report	Providing business reports periodically (period)

3.2. System Design

At the system design stage, this research uses the Context Diagram model, Data Flow Diagram (DFD) and Conceptual Data Model (CDM) as a tool in designing the integrated service information system for BUMDes Panggung Lestari.

3.2.1. Context Diagram

A context diagram is a diagram that shows the relationship between external entities, input and output from the system. This diagram is depicted with a circle that represents the entire system [9]. The Context Diagram in Figure 2 has four external entities that interact with the BUMDes Panggung Lestari integrated service information system. These external entities are Admin, Bumdes Director, Unit Operator, and Public users.

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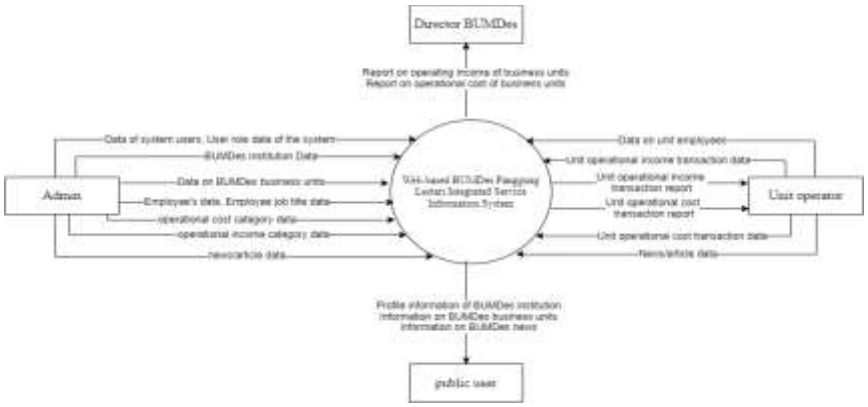

Figure 2. Context Diagram

3.2.2. Data Flow Diagram

DFD (Data Flow Diagram) describes data storage and processes that transform data. DFD shows the relationship between data in the system and processes in the system [9]. Figure 3 is DFD level 0 in the BUMDes Panggung Lestari integrated service information system which consists of six processes namely user registration, data management, transaction recording, transaction data processing, report processing, and access to information services.

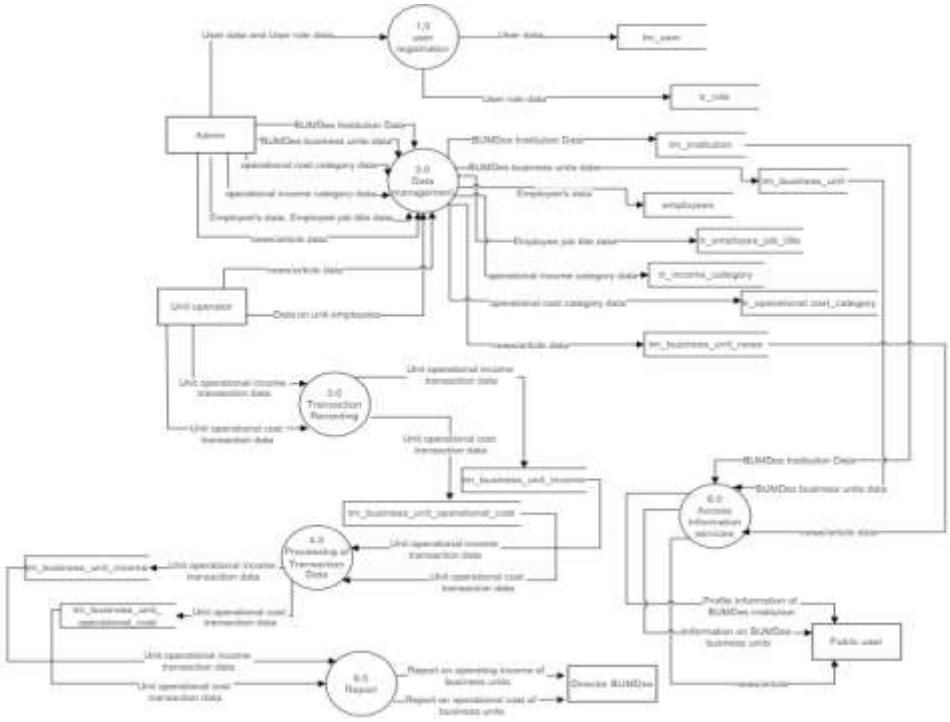

Figure 3. Data Flow Diagram Level 0

3.2.3. Entity Relationship Diagram

Entity Relationship Diagram (ERD) is a diagram used to design databases and describe relations or connections between entities or object and their attributes. Thus, ERD functions as a model that explains the relationship between data in a database based on main objects that are interconnected [18]. Figure 4 is an ERD that has been designed and then implemented into a database structure by adding Primary Keys and other required elements.

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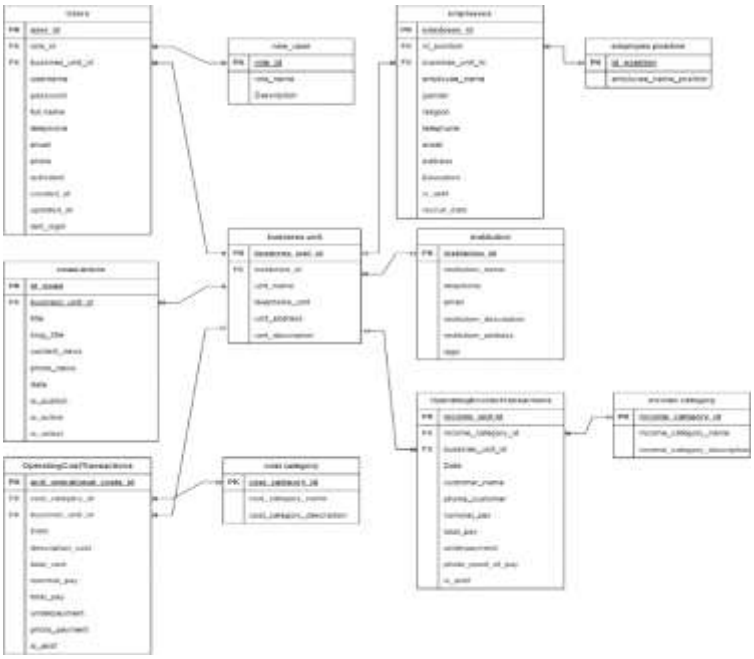

Figure 4. Entity Relationship Diagram

3.3. System Implementation

At this stage, a coding process is carried out to convert the system design into a runnable application. In this research, the web-based application development process was carried out using the PHP programming language with the help of the CodeIgniter 3 framework. CodeIgniter framework is a popular PHP framework for web application development. This framework separates views, business logic, and control processes, allowing users to focus on specific parts of the application being developed [19]. The following is a menu display of the web-based BUMDes integrated service information system that has been created.

1. Main Page

   The main page on the BUMDes integrated service information system displays a brief summary of BUMDes, such as BUMDes profiles, business units and news information. There is a navigation menu on the main page which consists of menus Home, menu About, business unit menu, news menu, and contact menu which can be seen in Figure 5.

Figure 5. Main Page

2. News Page
   The news page contains a collection of BUMDes Panggung Lestari news. Users can search for and read BUMDes Panggung Lestari news on this page as in Figure 6 below.

Figure 6. News Page

3. Login Page
   The Login page is used by users to carry out the login process to enter the BUMDes integrated service information system. There is an input field username and password which must be filled in by the user. The login page for this system can be seen in Figure 7.

Figure 7. Login page

4. User Data Management page
   The user data management page consists of a user data page and a page form to add user data. HThe user data page is used by the admin to manage user data of the BUMDes Panggung Lestari integrated service information system web-based as shown in figure 8.

Figure 8. User Data Page

Admin users can add new user data on the add user data form page where there are several input fields which must be filled in. The form page for adding new user data in this system can be seen in Figure 9 below.

Figure 9. New System User Add Form Page

5. Employee Data Management Page
   The Employee Data Management page contains a collection of unit employee data. There are features *CRUD* (Create, Read, Update, Delete) in this system that can be used by users of this system. This feature allows users to add, view, update and delete data as needed. The employee data management page display can be seen in Figure 10 below.

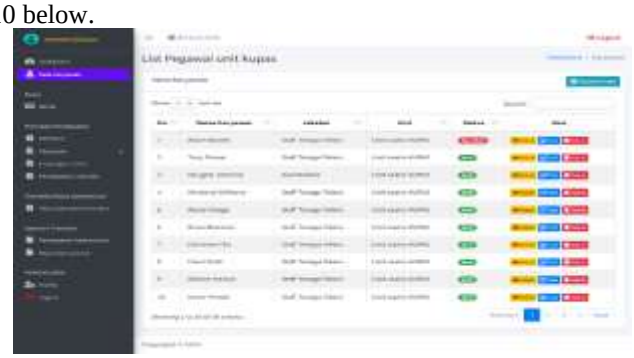

Figure 10. Employee Data Management Page

6. News Data Management Page
   The News Data Management page contains a collection of BUMDes news data as shown in Figure 11. Users can access the features CRUD (Create, Read, Update, Delete) in this system to add, view, update, and delete data as needed.

Figure 11. News Data Management Page

7. Transaction Form Page
   The Transaction Form page is used by operator users to record business income transactions and business operational costs. The income transaction form page contains input fields for entering income transaction data as shown in Figure 12.

Figure 12. Income Transaction Form Page

There is also an operational cost transaction form that is used to record operational cost transactions for BUMDes business units, as shown in Figure 13.

Figure 13. Operational Cost Transaction Form Page

8. Reports Page
   The report page presents data which is the result of system processing, arranged in summary or detailed form according to the input that has been previously processed.

Figure 14. Report page

3.4. System Testing

At this stage, the system that has been implemented is tested using the black box testing method.

Table 2. Black box Testing

No.	Test Scenarios	Expected Results	Test Results
1.	Login with the correct username and password.	The system successfully logs in and displays the dashboard page.	Valid
2.	Login with incorrect username and password.	The system refuses to log in and displays the message “Login Failed”.	Valid
3.	Add a user by filling in the form Full Name, Username, Role User, Unit, Password, Confirm Password.	The system accepts added user access and displays the message "Success! Account registration successful".	Valid

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4.	Add complete unit transaction data.	The system receives and displays the message "Success Data added successfully".	Valid
5.	Add employee data by filling in the input form.	The system accepts to add data, and displays a message "Success, data has been saved".	Valid
6.	Add news data by filling in the input field form Unit, Title, News Content.	The system receives and displays the message "Success Data added successfully".	Valid
7.	Search for data according to period date.	The system receives and displays data according to the period date.	Valid
8.	Print PDF Format Transaction data recap report.	The system receives and creates PDF files according to data from the database.	Valid
9.	Displaying the main page (home)	The system displays the main page correctly.	Valid
10.	Displays the Page according to the selected navigation menu link.	The system accepts and each link directs the user to the appropriate page.	Valid
11.	Displays complete details of the news content.	The system displays complete news clearly and easily to see.	Valid

From system testing it can be concluded that the system built is free from syntax errors and functionally produces results that are in line with expectations and is suitable for implementation.

4. CONCLUSION

This research produces a web-based BUMDes integrated service information system application that can be used by BUMDes to manage, monitor and supervise BUMDes business activities. Based on black-box testing, this application was declared to meet the eligibility criteria for implementation. Testing was carried out on main features, such as the login process, data input, and report creation process. This system was developed to include various user interfaces specifically designed for admins, unit operators, BUMDes directors and the general public. The system display structure consists of several main elements, such as the home page, news page, login page, transaction page, employee page, and report page, which are designed to meet user needs. The system created is effective in recording business operational income transactions and business operational costs regularly and accurately. It is also efficient because it is integrated with other business units in one system, so that BUMDes can print reports that can be used for analysis and evaluation of operational performance directly and quickly. Thus, the BUMDes integrated service system is expected to improve BUMDes performance in managing business units and have a positive impact in increasing Village Original Income and the welfare of village communities. As a suggestion for further system design, to be able to add a data import feature from Excel files to the system. This feature allows users to upload data in bulk, thereby saving time and reducing input errors.

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