

# Analysis and Design of Bumdes Applications Using the Waterfall Method

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**Abstract:** With the existence of Bumdes, it is hoped that it will further move the wheels of the economy and contribute to Original Village Income (PaDes) so that it will have an impact on increasing the rate of village development and improving services to villages. Leading to a more prosperous standard of living for the people of Sungai Ular Village. The BUMDes application in Sungai Ular Village can help Sungai Ular Village in terms of promoting online-based businesses, can make it easier for the community to submit applications for savings and loans, can find out the financial income of BUMDes businesses, and can make it easier to prepare financial reports for BUMDes Sungai Ular, so the design of this application helps resolve existing problems.

**Keywords:** Bumdes Application; Village Application; Waterfall Method;

## INTRODUCTION

The rapid development of information technology has brought the world into a new era faster than previously imagined. This technological development has brought changes in various areas of human life (Ramadhani et al., 2022). One of the results of technological progress is the production of computers as a tool to help humans in doing work and also the internet as a means of connecting communication used through computers. The increasing business competition, then in line with the development of information flow, a company is required to be able to provide more complete and accurate information, both for internal and external interests with the development of increasing information flow, the need for information technology is very important as one of the factors to be able to compete, in this case, the role of computers is needed in helping to carry out the activities of each employee according to their position and duties.

As for village businesses, they are types of businesses in the form of village economic services such as service businesses, distribution of nine basic commodities, trade in agricultural products, and industry and crafts. With the existence of Bumdes, it is hoped that it will further drive the economy of Sungai Ular village and contribute to the Village Original Income (PaDes) so that it has an impact on increasing the rate of village development and improving services to the village community, which ultimately leads to a more prosperous standard of living for the people of Sungai Ular Village.

Sungai Ular Village is one of the villages located in Secanggang District, Langkat Regency, North Sumatra Province, BUMDes Sungai Ular has types of businesses such as culinary businesses, savings and loan businesses, which in BUMDes data collection and bookkeeping of Bumdes Sungai Ular Village are still done manually by recording them with the Microsoft Excel application and then making reports, the Sungai Ular community also does not know anything about the existence of the Village-Owned Business so that the business managed by the Village is less effective and efficient.

According to previous research by M. Adam Fahreza (2022) entitled Design and Construction of a Village-Owned Enterprise (Bumdes) Information System Based on a Website. The purpose of this research is to support existing administrative services and also to transition service patterns to digital utilization and educate managers or admins of BUMDES Bumisari through an application usage guidebook so that they become accustomed to carrying out administration online in order to balance administrative needs in the digital era. The advantages of this research are that it is responsive to mobile devices, uses the Extreme Programming method and PHP programming language, saves time in administration, and facilitates marketing promotions managed by BUMDes (Ramadhani et al., 2022).

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There is also previous research by Fauziah Yulianti (2021), entitled Analysis and Design of Bumdes Data Processing Information System in Seberang Cengar Village, Kuantan Mudik District, Kuantan Singing Regency. The purpose of this study is to facilitate Bumdes managers in recording Bumdes data and providing information that is easily accessible to the public. The advantages of the system built are using the PHP Laravel Framework, there are multilevel features, the waterfall method, and pdf report features(Yulianti, 2021).

Meanwhile, previous research by Kholizar Nafian (2023) entitled Website-Based Village-Owned Enterprise (BUMdes) E-commerce Application. The purpose of this study is to encourage the success of bundles to improve and expand product marketing and reach consumers more widely and quickly. Through the provision of e-commerce-based information technology facilities used as a global business communication medium. It is hoped that Bumdes can get various benefits in promoting their business products, providing detailed product information without having to come to Bumdes first, reporting product sales results, and conducting transactions online and conducting other business communications globally(Nafian et al., 2023).

Based on previous research and the problems above, a BUMDes Application Design is needed in Sungai Ular Village, where the application can help BUMDes Sungai Ular Village in terms of promoting online-based businesses, can make it easier for the community to apply for savings and loans, can find out the financial income of BUMDes businesses, and can make it easier to make financial reports for BUMDes Sungai Ular, so that this Application Design helps solve existing problems.

## LITERATURE REVIEW

### Application

An application is a program or software designed to perform certain functions on electronic devices, such as computers, smartphones, or tablets. This term comes from the English word "application software," which means application software. In the context of today's technology, applications are very diverse, covering various sectors and needs. Their main function is to make human life easier (Faqih & Widya, 2023). With applications, various jobs and activities can be completed more efficiently. Their functions can also be distinguished based on their intended use, ranging from productivity applications, and entertainment, to educational applications (Waruwu & Ridho, 2024).

### Types of Applications

#### 1. Mobile Applications

This type of application is designed specifically for mobile devices, such as Android and iOS. Examples of mobile applications include social media, games, and productivity tools.

#### 2. Web Applications

These applications run in a browser and do not need to be downloaded. Examples of web applications are e-commerce platforms and online collaboration tools.

#### 3. Desktop Applications

Designed for use on computers, desktop applications have more complex features such as graphic design software and data processing.

### BUMDes

Village-Owned Enterprises (abbreviated as Bumdes) are village businesses managed by the Village Government and are legal entities. The Village Government can establish a Village-Owned Enterprise according to the needs and potential of the Village. The establishment of a Village-Owned Enterprise is stipulated in a Village Regulation. The management of a Village-Owned Enterprise consists of the Village Government and the local village community (Muhammad Khovivul Anam et al., 2024). The capital of a Village-Owned Enterprise can come from the Village Government, community savings, assistance from the Government, Provincial Government, and Regency/City Government, loans, or capital participation from other parties or profit-sharing cooperation on a mutually beneficial basis. Village-owned enterprises can make loans, which can be done after obtaining approval from the BPD (Hikam et al., 2021). Village Fund Allocation is a fund allocated by the Regency/City Government for villages, which comes from part of the central and regional financial balance funds received by the Regency/City. The Village Revenue and Expenditure Budget, hereinafter abbreviated as APB Desa, is the annual financial plan of the village government which is discussed and approved jointly by the Village Government and BPD, which is stipulated in a Village Regulation.

### Website

The word Website is very familiar among the public, but not a few people understand what a website is. A website is a central document delivery system that stores a collection of pages containing various important information that can be accessed by everyone via the Internet (Waryanto 2021). This website was created with the

aim of making it easier for researchers to exchange important information when working or conducting research. Websites as we know can be owned by individuals, groups, organizations, or companies to share interesting information or focus on a particular topic. Currently, websites are packaged as simply and attractively as possible so that people can easily enjoy and get information because they see the interest of web users.

## METHOD

This research was conducted at the Sungai Ular village office. The research method was conducted to obtain the information needed in order to achieve the research objectives. The objectives expressed in the form of Data Collection Techniques were carried out through observation, interviews, and library methods (Library Research). Direct observation or observation was conducted at the Paya Bengkuang village office to obtain data and information regarding the needs of the system to be developed. Interviews were conducted with village officials to find out how the system process is running as a whole.

The research was conducted through the stages of the Software Development Life Cycle (SDLC)(Permana et al., 2023). In this study, the SDLC method was used to develop the Bumdes application system using the waterfall method(Permana et al., 2023). The waterfall method is one of the methods in SDLC that is often used in the development of information systems or software(Zalukhu et al., 2023). This method uses a systematic and sequential approach. The stages in this method start from the planning stage to the management stage (maintenance) and are carried out in stages. Developers need to know more about how the system development process is when using the waterfall method and also the characteristics of the waterfall method(Zalukhu et al., 2023).

Waterfall is a model that was first used and is very common in the project creation process in large agencies or industries. Waterfall emphasizes documentation and this model is suitable for projects that prioritize quality[8].

The analysis of the Bumdes System currently running in the Sungai Ular Village Office, Secanggang District, Langkat Regency still uses manual records in recording Bumdes Savings and Loans, Income and Expenditures of Bumdes so in making reports it is less effective and efficient, so Bumdes Application system is needed which can later facilitate Sungai Ular village employees in recording savings and loans, recording Bumdes income and expenses, and can facilitate the community in obtaining Bumdes information, especially Bumdes Sungai Ular Village.

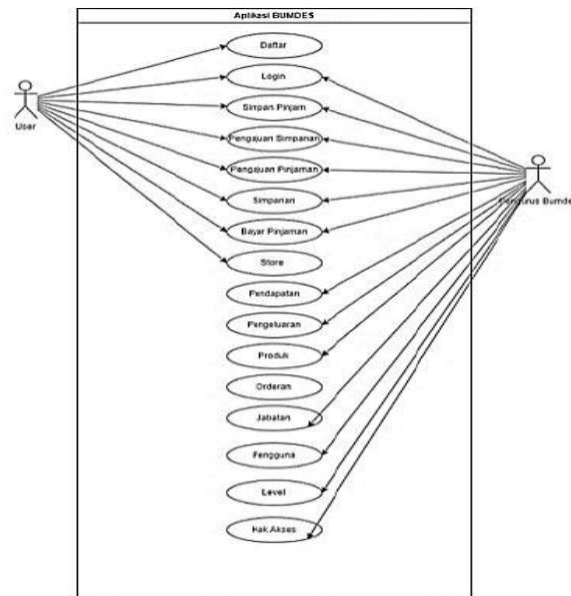
The weaknesses that occur in the old Bumdes system in Sungai Ular Village include the following: (1) The community must come directly to Sungai Ular Village to apply for Savings and Loans or to purchase Bumdes Products. (2) Resulting in an increasing number of hardcopy archives and making it difficult when the administration intends to recap and re-record savings and loan data and Bumdes product order data. (3) Errors are easy to occur in recording the income and expenses of Bumdes Sungai Ular Village.

The system that will be built in Sungai Ular Village, where the application can help BUMDes Sungai Ular Village in terms of promoting online-based businesses, can make it easier for the community to apply for savings and loans, can find out the financial income of BUMDes businesses, and can make it easier to make financial reports for BUMDes Sungai Ular so that this Application Design helps solve existing problems.

At the design stage of this system, the researcher uses Flowchart modeling, Erd and the author also use the UML (Unified Modeling Language) concept to model the system to be created. In UML there is a modeling stage consisting of various UML diagrams such as Use Case Diagrams and Activity Diagrams. The information system will produce data reports that can be accessed by authorized parties. If there is a data request from an external party, the system provides limited access according to the established policy(Sukamto, 2022).

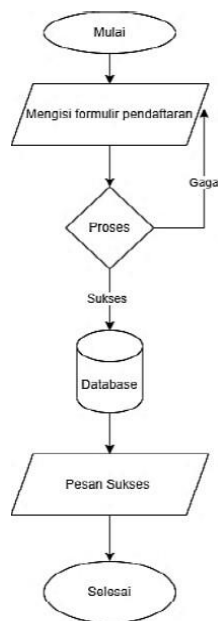
This flowchart is the initial step in creating a program. With the Flowchart, the sequence of activity processes becomes clearer. If there is an additional process, it can be done more easily. After the Flowchart is completed, the programmer translates it into a program form with a programming language. A flowchart is a graphical representation of the steps and sequence of procedures in a program(Usnaini et al., 2021).

Use Case Diagram is a diagram that describes the relationship between actors and the system. Use case diagrams can describe an interaction between one or more actors and the system to be created. Use case diagrams can be used to find out what functions are in a system and can present an interaction between actors and the system(Setiawan et al., 2022). The following is a Use Case Diagram Image of the Bumdes Application. can be seen in image 1 below.



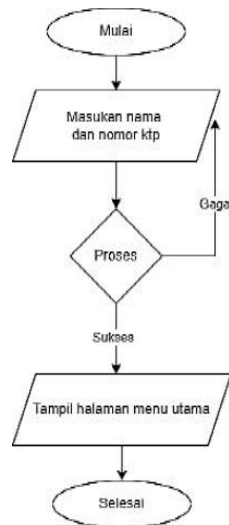
**Figure 1.** Usecase Diagram of Bumdes Application

In the image above, it can be seen that there are two actors, namely the User actor and the Bumdes Administrator actor, each actor has different access rights such as the user actor has access to register, login, save and borrow, submit savings, submit loans, pay, loans, view savings data and can access the Bumdes store. The Bumdes administrator actor has access such as login, save and borrow, submit savings, submit loans, savings data, loan data, Bumdes store, income, expenses, products, orders, positions, users, levels, and access rights. The following is a Flowchart Image of the Bumdes Member List in Sungai Ular Village which can be seen in Figure 2 below.



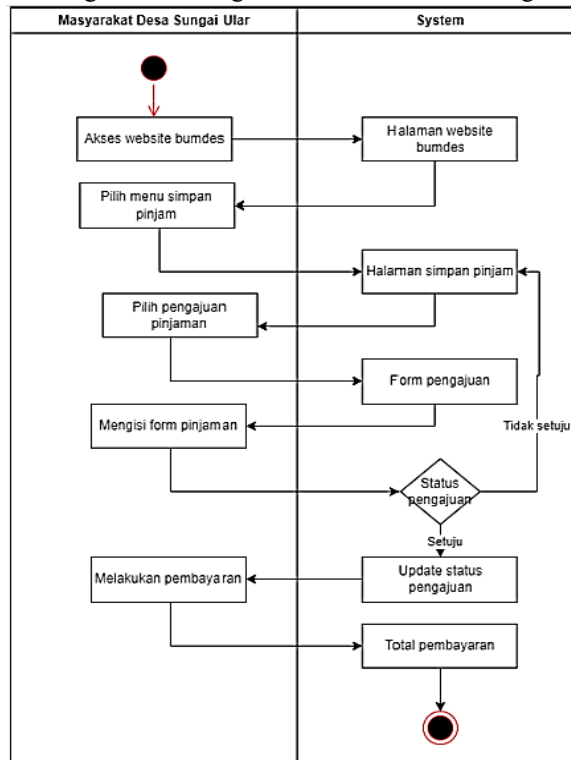
**Figure 2.** Flowchart of Bumdes Member List

Based on the image above regarding the flowchart of the bundles member list, the first step taken by the user to register is to enter data in the form of Name, Gender, Place of Birth, Date of Birth, Address, Mobile Number, and KTP Number. When the user presses the register button, there will be a validation process that will check whether the data you entered is correct, if the validation fails, the user will be redirected back to the bumdes member registration page and if the validation process is successful, the data you entered will be inputted into the Bumdes database and the Bumdes member registration is successful. The following is a Flowchart Image of the Bumdes Member Login in Sungai Ular Village, which can be seen in Figure 3 below.



**Figure 3.** Bumdes Member Login Flowchart

Based on the image above regarding the user login flowchart, the first step taken by the user to log in is to enter data in the form of a name and ID card number. When the user presses the login button, there will be a validation process that will check the name and ID card number in the database whether the name and ID card number are registered. If the validation process is successful, the user will be directed to the main page, and if validation fails, the user will be directed to the login page again. The following is a picture of the Activity Diagram for Loan Application at Bumdes Sungai Ular Village, which can be seen in Figure 4 below.



**Figure 4.** Activity Diagram for Loan Application

Based on the image above regarding the Activity Diagram for Loan Application in Sungai Ular Village, the first step taken by the user or the Sungai Ular Village Community to apply for a loan is to access the bundle's website then the user selects the loan application, fills in the loan form, after that the user will wait for the approval of the application. If the status is approved then the user will make a loan payment and if the status has not been approved then it will be directed to the savings and loan page. The following is a picture of the Activity Diagram for Deposit Application in Sungai Ular Village which can be seen in image 5 below.

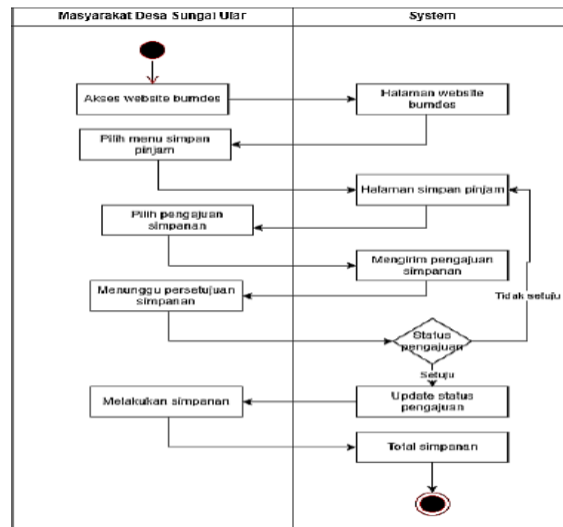


Figure 5. Activity Diagram for Submitting Savings

Based on the image above regarding the Activity Diagram for Submitting Savings in Sungai Ular Village, the first step taken by the user or the Sungai Ular Village Community to submit a savings application is to access the bundle's website then the user selects the application of the savings, after that the user will wait for the approval of the application if the status is approved then the user will make a deposit and if the status has not been approved then it will be directed to the savings and loan page.

The definition of a database is a collection of interrelated data (relationships). The term is commonly used in computerized systems. In a general sense, a database is defined as a combination of related and organized data elements. Relationships are usually indicated by the key of each existing file. In one file there are records of the same type, the same size, the same shape, which are a collection of uniform entities. One record consists of interrelated fields indicating that the field is in a complete sense and recorded in one record.

A database is a collection of data that is mechanical, divided, normally defined, and controlled. The function of the database is to group information so that it is easier to understand, prevent duplicate data or data inconsistencies, and facilitate the process of storing, accessing, updating, and deleting data.

MySQL is an open-source SQL database management system and is the most widely used today. The MySQL database system is able to support several features such as multithreaded, multiuser, and SQL database management systems (DBMS).

The following is a picture of the Relationship Between Tables in the Bumdes Application in Sungai Ular Village, which can be seen in Figure 6 below.

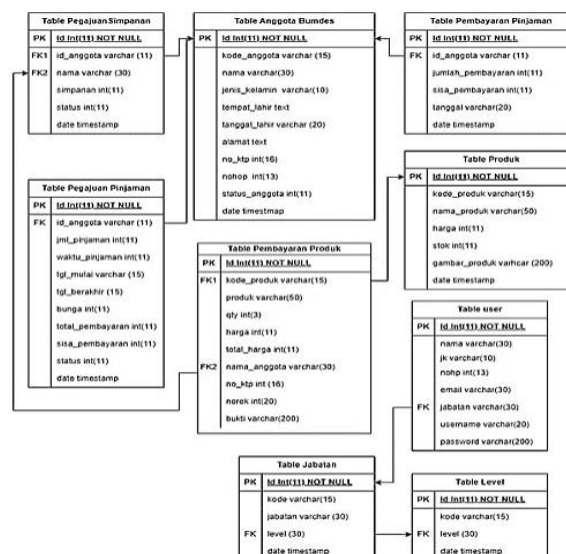


Figure 6. Bumdes Application Database Relations

With a well-structured database system, information about Sungai Ular Village can be stored neatly and easily accessed. This will make it easier for system users to search for and obtain the information they need. In addition, a good database system can also support efficient and accurate data management. After designing, the next step is to enter the XAMPP Software to be able to enter PHPMyAdmin to create a database. The collected data is then input into the information system for validation. After the data is validated, the information is stored in the database.

## RESULT

In the results of this trial and discussion, the researcher formed a program display that will be displayed from data input to output. The form of the program that the author designed can be seen below. The following is a picture of the Main Page of the Bumdes Application User, which can be seen in Figure 7 below.



Figure 7. User main page

The home page is the first page when the user opens the Bumdes Sungai Ular Village page with the welcome text in the Bumdes Sungai Ular Village application as shown above. The following is a picture of the Bumdes Member Login Page which can be seen in image 8 below.

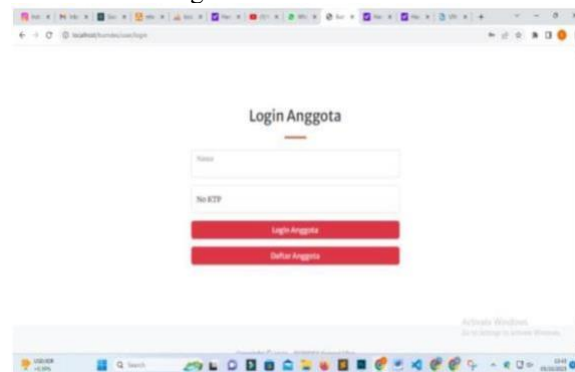


Figure 8. User registration page

In this menu display, each user must first register to access the available features by correctly inputting the registration form. The following is a picture of the Bumdes User Login Page, which can be seen in Figure 9 below.

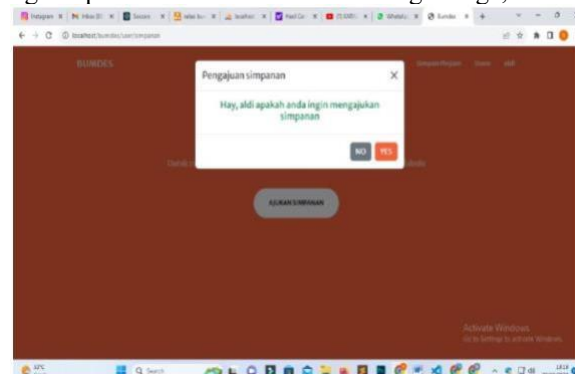
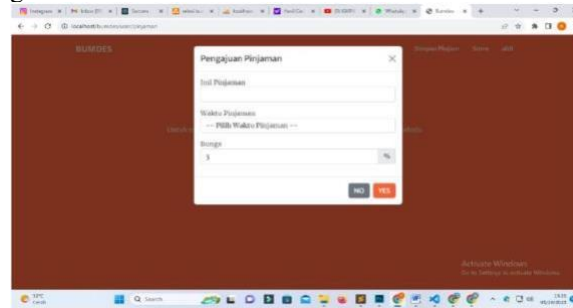


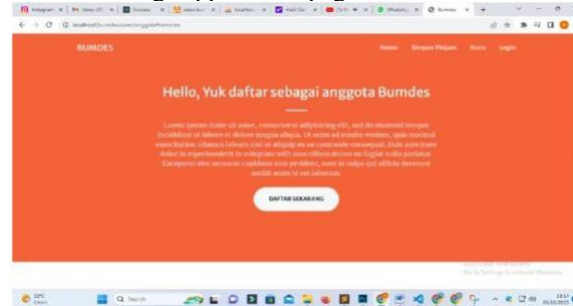
Figure 9. User Login Page

In this menu display, every user who wants to make savings and loans and visit the Bumdes store must first log in by entering the user's name and ID card number. The following is a picture of the Bumdes savings and loans page, which can be seen in Figure 10 below.



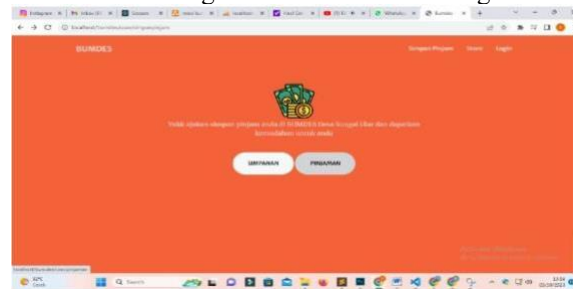
**Figure 10.** User savings and loan page

This page display is a page for submitting savings or submitting a Bumdes Sungai Ular loan application. The following is a picture of the Bumdes Savings application page which can be seen in picture 11 below.



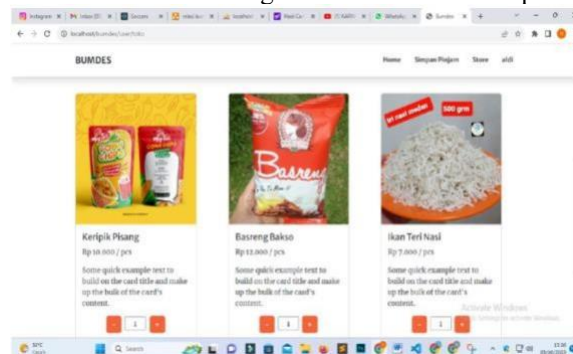
**Figure 11.** Deposit application page

The Deposit Submission Page is a feature for submitting deposits to the Bumdes manager of Sungai Ular Village, where the submission data will be verified by the Bumdes manager of Sungai Ular Village. The following is a picture of the Bumdes Loan Submission Page which can be seen in figure 12 below.



**Figure 12.** Loan application page

The Loan Application Page is a feature for submitting a loan application to the Bumdes manager of Sungai Ular Village, where the application data will be verified by the Bumdes manager of Sungai Ular Village. The following is a picture of the Bumdes Online Store Page which can be seen in picture 13 below.



**Figure 13.** Bumdes Online Store Page

## DISCUSSIONS

The Online Store Page is a feature for making purchases of Bumdes Sungai Ular products online. With the development of science and technology today, computers have played an important role in companies or agencies, both large and small, because each program is faster and more precise when developed with a computerized system. For this reason, the author proposes a more efficient and effective way of managing Bumdes Sungai Ular Village.

The advantages of this system are as follows: (1) The Bumdes Management Section does not need to manually record Bumdes Sungai Ular's income and expenditure data. (2) The community or Bumdes members are easier and faster in applying for loans, and savings and purchasing Bumdes Sungai Ular Village products. (3) There will be no loss of Bumdes Sungai Ular Village data because data storage is accessed at any time and reduces hard copies which were previously still done by recording manually. (4) Makes it easier for leaders to monitor Bumdes Sungai Ular Village data.

In addition to having advantages, this system also has disadvantages in its design, namely as follows: (1) The Bumdes Application of Sungai Ular Village does not use the Payment Gateway method in terms of online shop payments. (2) The Bumdes Online Shop of Sungai Ular Village still uses a manual Checkout system with a Bank Transfer payment method. (3) The Bumdes Application of Sungai Ular is still local (offline) so the people of Sungai Ular Village have not been able to access the application.

## CONCLUSION

Based on the research that has been conducted, several things can be concluded as follows: (1) A "Website-Based Application for Sungai Ular Village-Owned Enterprises" has been successfully built which can help and facilitate Bumdes managers to manage business digitalization. (2) Facilitate Bumdes managers in Sungai Ular Village to provide information and services to the people of Sungai Ular Village which can be accessed online. (3) Facilitate village communities to apply for savings, and loans and purchase Bumdes products in Sungai Ular Village which can be accessed online. (4) Facilitate Bumdes managers in marketing products with a wide reach.

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