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Innovation of Information System Based Waste Bank in Pari City Village

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***Abstract* — Innovation in waste bank management in Pari City Village by integrating information technology in its management. This research aims to explore innovative efforts in waste bank management by utilizing information systems. The methodology used in this study is a case study, where data is collected through interviews, observations, and review of related documents. The results of the study show that the management of waste banks in Pari City Village has innovated by integrating information systems. These innovations include the use of waste bank applications to record waste transactions, calculate savings values, and promote waste bank activities. The information system implemented also allows real-time monitoring and reporting of waste bank performance. The integration of information technology in the management of waste banks has increased efficiency, transparency, and community participation.**

Keywords — Waste Bank, Information System, Waterfall

I. INTRODUCTION

Effective and efficient waste management is a challenge faced by many regions in Indonesia [1]. One of the innovations developed to overcome the waste problem is through the waste bank program. A waste bank is a collective waste management system that encourages the community to actively participate in it.

The concept of a waste bank as a solution to change the community paradigm in waste management is a new innovation for the people in the district [2].

In Kota Pari Village, the waste bank program has been initiated by the village government to encourage community participation in waste management. However, in its development, the management of waste banks in this village then experienced various obstacles, including the lack of recording and reporting transactions, the difficulty of monitoring the performance of waste banks, and the lack of promotions to increase community participation.

The potential opportunities for waste banks to sell and process waste are actually very large, but some weaknesses need to be considered such as the lack of waste volunteers in picking up existing waste, lack of public awareness in sorting waste, saving in waste banks and processing waste and recording waste is still manual so that there are still errors in waste bank bookkeeping [3]

To overcome this problem, the waste bank management in Pari City Village then innovated by utilizing information technology in its management. Therefore, a system is needed that can be used to record data digitally and can be accessed via the internet. This system can help the village government in managing data more effectively and efficiently, as well as make it easier for the village government to make policies and development plans that are in accordance with the needs of the population [4]

Waste banks are the same as banks in general, which have a function to manage data so that their business processes can run effectively and efficiently. The village of Kota Pari has an economically potential community group that is active in MSMEs (Micro, Small and Medium Enterprises) which is starting to lead to a digital system [5]

II. LITERATURE REVIEW

Community-based waste management is a strategy recommended by the government to realize a zero waste society. [1] This can be realized through the development of waste banks at the RW and sub-district levels. Some of the research related to information system-based waste bank innovations include:

Previous research in Semarang City has analyzed that community-based waste management through waste banks is able to identify waste flows in Semarang City [1]. In 2019, Semarang City was identified as having 48 waste bank units that actively manage community waste, especially plastic, paper, and metal [1].

Furthermore, research in Banyumanik District, Semarang City found that one of the important factors affecting the success of the waste bank program is the support of funds and information technology to support the management of waste banks [6].

Meanwhile, another study in Pudakpayung Semarang Village identified the need for revitalization of the integrated waste management system, including increasing community participation through empowerment.

III. RESEARCH METHODOLOGY

In managing this waste bank, an information system in the form of an application is needed. This application allows the integration of administrative service information into the

system through the use of the waterfall method in four stages: requirements analysis, system design, implementation, and system testing [7]. The waterfall model is the most widely used model for the development stage [8]. In building this system, the author applies a waterfall model so that it can be completed in a structured and orderly manner. Waterfall models are often also called linear sequential models or classical lifelines [9]. This model is an approach to systematic software development with several stages. The stages of the Waterfall Paradigm can be seen in the following figure:

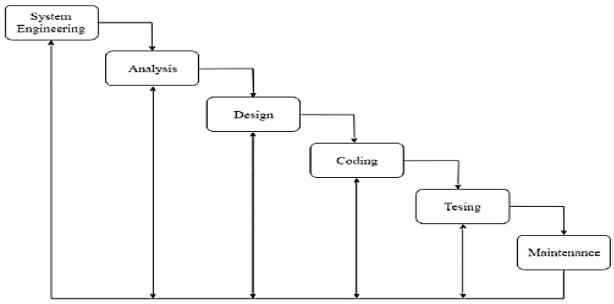

Fig. 1. Metode Waterfall

A. *Types and Locations of Research*

In conducting this research, the type of research used is a qualitative method by collecting data. This type of research is considered very suitable for the research raised by the author so that the focus of the research is in accordance with the facts in the field. The location of this research was carried out at the Waste Bank of Kota Pari Village, Pantai Cermin District, Serdang Bedagai Regency, North Sumatra.

B. *Data Collection Methods*

- Data Processing
  Data reduction is reducing or sorting data that is in accordance with the topic where the data is generated from research and then data coding, which is the adjustment of data obtained in conducting literature research and field research with the subject matter of the problem by giving a specific code code to each data
- Data Analysis
  The data analysis technique aims to describe the data to solve problems based on the data obtained. Analysis and qualitative are efforts made by collecting, sorting, clarifying, and recording results in the field and providing code so that the source of the data can be traced.
- Needs Analysis
  In the design of this waste bank information system, data collection is carried out by collecting the type and price of waste at the waste bank in the village waste bank of Kota Pari. The following is the data on the list of waste that is managed:

TABLE. 1 LIST OF TYPES OF GARBAGE

It	Types of Waste	Garbage Name	Price/Kg
1	Metal	Aluminum	5000
2	Metal	Brass	4500
3	Plastic	Bottle	4000
4	Kertas	Paralon	800
5	Kertas	Notebook	1800
6	Kertas	HVS	1900
7	Kertas	Newspaper	2000
8	Kertas	Magazine	650
9	Kertas	Box	1400

C. *Planning*

User needs planning is in accordance with the method of collecting data based on observation and interviews to be used in the design of a system.

D. *Use Case*

To get information from a system created, the author uses a use case diagram, which can be seen below:

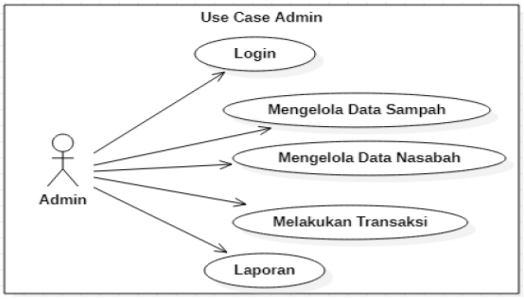

Fig. 1 Use Case Diagram Admin

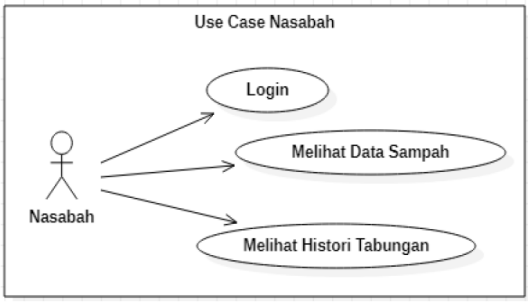

Fig. 2 Use Case Diagram Nasabah

E. *Activity Diagram*

a. Activity Diagram Admin

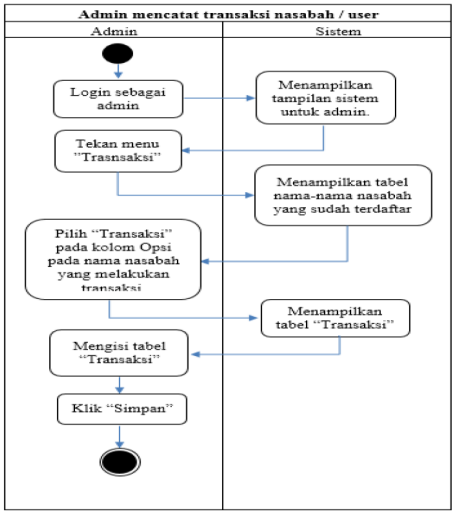

Fig. 3 Activity Diagram Admin

b. Activity User/Nasabah

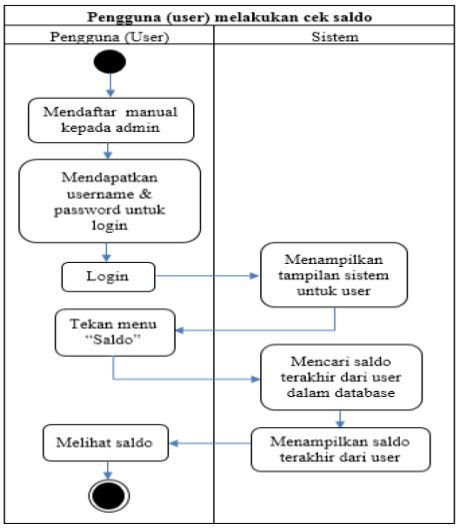

Fig. 5 Activity User

c. Garbage Deposit

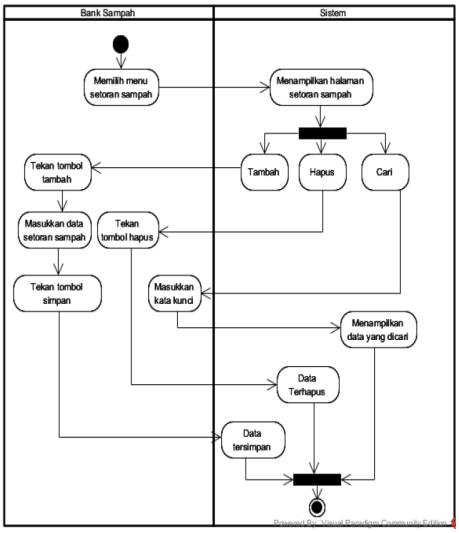

Fig. 6 Activity Setoran Sampah

d. Sequence Diagram

Sequence Diagrams describe the interactions between objects in and around the system in the form of messages depicted against time. The following is a sequence diagram of the waste bank system

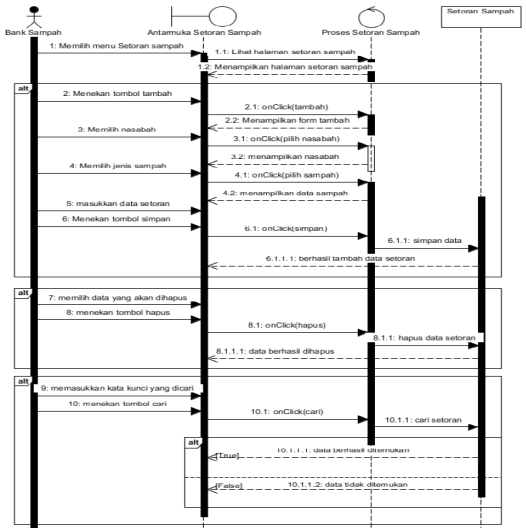

Fig. 7 Sequence Diagram

e. Database Design

In creating an information system, a database is needed. In the construction of the waste bank information system, the following relationships between the tables are used as follows:

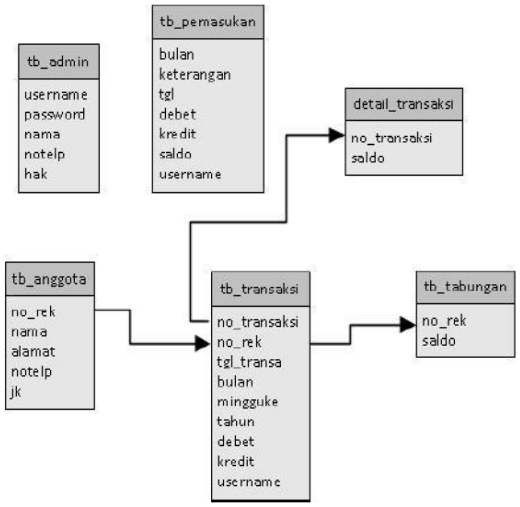

Fig. 8 Activity Setoran Sampah

f. Class Diagram

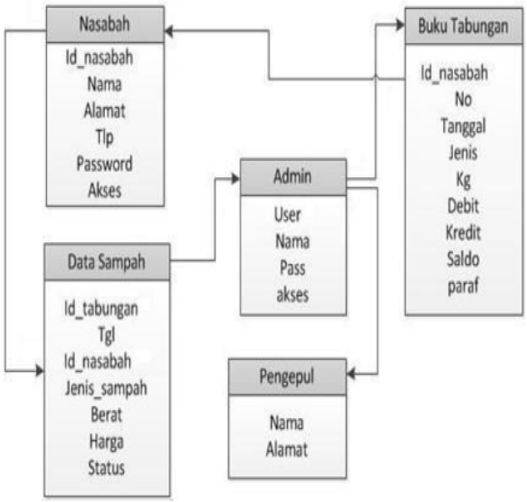

Fig. 9 Class Diagram

g. User Interface Design

In the web-based waste bank information system application, there are several parts of the display that have different functions on each button. The functions of the buttons on each part of the display will be explained and can be seen in the following image:

- Admin Login Page Display Design
- Main Menu Display Design
- Customer Menu Display Design
- Garbage Type Menu Display Design
- Customer Log Menu Display Design
- Info Menu Display Design
- Navigation Architecture Design
- Database Design

IV. RESULT

Program implementation includes a series of steps or procedures that are carried out after the system is completed and approved. The stage includes testing, installation, and launch of a new or improved system. Before the system is actually operated, testing is carried out first. If any errors are found during testing, the system will be corrected and testing will continue until the system is ready for operation. In this test, the author used the Google Chrome web browser to run a web-based system. After the web browser is activated, then the author types htttp://localhost/banksampah/admin on the address bar to test the login page of the web-based waste bank information system application. Here are the details of the app:

A. Login Page

This page is the admin login page when accessing the address bar, from this page there are menus that can be accessed by the admin

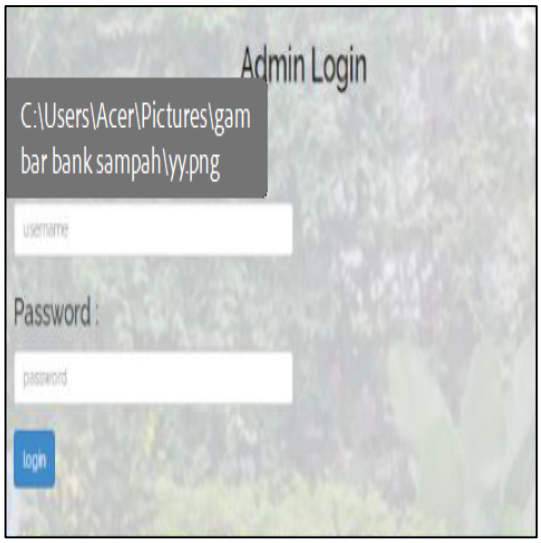

Fig.10 Login Page

B. Admin Page

This page is the main page of the admin after logging in, from this page the admin can start working

Fig.11 Admin Page

C. Customer page

On this page, admins can see all customer data and can also add new customers

No. Rekening	Nama	Alamat	Tanggal Lahir	Saldo	Peringkat	Edit	Hapus
2147483643	Alfandio G	Desa Kota Pari	1994-01-01	100000	1		
1647483643	Utari A	Desa Kota Pari	1994-07-09	189000	1		
1640003643	Ahmad	Desa Kota Pari	1992-12-01	20000	2		
1657333643	Dindin	Desa Kota Pari	1994-12-28	450100	3		
1640003000	Hammad	Desa Kota Pari	1974-08-08	12300	1		
1640003121	Rudi Hartono	Desa Kota Pari	1994-02-07	145500	1		
2147483647	Teguh Cigalpa	Desa Kota Pari	1995-11-12	15000	1		

Fig.12 Customer Data Page

D. Garbage Data Page

This page is a waste data page in the form of prices, types, and categories of waste found in banks

Kode	Kategori	Jenis	Harga	Edit	Hapus
101	Plastik	Bening	2000		
102	Plastik	Sablon	500		
103	Plastik	Aqua Gelas	5500		
104	Plastik	Botol	4000		
105	Plastik	Paralon	800		
201	Kertas	Buku Tulis	1800		
202	Kertas	HVS	1900		
203	Kertas	Koran	2000		
204	Kertas	Majalah	650		

Fig.13 Waste Data

E. Customer Log Page

The customer log page is a page that contains all waste bank customer activities such as adding new customers, adding nasaba deposits and also withdrawing customer deposits.

Fig.14 Customer Log

DISCUSSION

There are several advantages and disadvantages of the web-based waste bank information system application that is built, including:

1. System Advantages
   a. This web-based waste bank information system application can make it easier for users to record customer data in the waste bank.
   b. With this application, it can make the awareness of the community under waste not just waste but waste can be converted into economic value that is beneficial for the community around Pari City Village.
2. System Shortcomings
   a. This application can only be accessed by admins from the waste bank.
   b. Waste bank activities can only cover the Pari City Village environment.

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