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Waste Bank Information System in Improving the Economy and Environmental Impact Control in Pari City Village

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ABSTRACT

The Pari City Waste Bank application utilizes a computerized system in managing waste involving the field of information technology. This shows that information technology has become a supporting part in waste management. This waste bank is an institution in the village engaged in waste processing. In addition to saving and sorting waste, the waste bank also teaches the community to process waste into useful goods that have a selling value. A computerized system is needed in waste bank institutions so that their performance can improve and the institution can develop better. From the existing problems, the author created a system for transactions and management of Waste Banks in Pari City using a web-based information system. The results of this web-based Waste Bank application can speed up and make it easier for officers to make transactions, process, and record customer savings data at the waste bank.

Keywords : Waste bank, Kota Pari Village, Application, Information System

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1. INTRODUCTION

Today, environmental issues are an important part of research in the 21st century. The issue of environmental problems is now not only a national issue, but it has become a duty for all countries to participate in improving and maintaining it(Utami et al., 2023). The demands of great living needs make humans put aside their environmental impact(Ramayadi & Sariningsih, 2020). A densely populated area is always faced with waste problems, including the volume of waste that exceeds the capacity capacity, ineffective waste management management, and lack of support from the government(Samadikun et al., 2016). The term waste is familiar to the public. If you hear the term garbage, of course, in the minds of some people is a pile of waste that causes a very pungent stench (Afuan et al., 2021). Waste is one of the triggers for environmental pollution that will result in damage to the ecosystem. So far, waste handling has been carried out conventionally, namely collection, transportation, and final disposal at the Final Disposal Site. Most of the people do not seem to be aware of the importance of good waste management, even though garbage does not just make a bad look and smells bad, piles of garbage in landfills and on the side of the road in the river can cause bigger problems than imagined (Firmansyah et al., 2019). Various efforts have been made by the government in managing waste so that it does not become a disaster that harms the community, including by issuing Law (UU) Number 18 of 2018 concerning waste management (Kusrini et al., 2019), as well as Government Regulation Number 81 of 2012 instructs a fundamental paradigm change in waste management, namely from a collection-transport-disposal paradigm to management that focuses on waste reduction and handling. Waste reduction efforts mean asking all levels of society, both the government, the business world, and the wider community, to implement the practice of minimizing waste stockpiles, recycling, and reusing waste, or known as Reduce, Reuse, and Recycle (3R) through a smart, efficient, and planned approach.

The main obstacle in 3R activities is the low awareness of the community to sort waste. Various methods have been carried out to help overcome waste management. One of the steps taken by the government to reduce the amount of waste heaps and encourage people to manage household waste well is to encourage the waste bank program(Arliansyah & Bahtiar, 2024). The Waste Bank is one of the solutions in helping to solve waste management (Julianto et al., 2019), which is a social engineering activity. This activity teaches the community to sort waste and grow their awareness in managing waste wisely. This can reduce the waste transported to

landfills. The construction of the Waste Bank is a starting point to foster public awareness to start sorting, recycling, and utilizing waste. This is based on the fact that waste has a good enough selling value, so that environmentally friendly waste management can become a new culture in Indonesia.

The process of managing the waste bank in Pari City begins with customer registration which is carried out by filling out a form. Customers who have been registered can make transactions such as saving and withdrawing at the waste bank. Every transaction must be made through a bank officer and recorded in the customer's passbook. Furthermore, the waste weighing process is carried out with the officer notifying the location of the customer's waste collection and weighing. In the waste saving process, the Pari City Village Waste Bank can pick up waste. The garbage pick-up is carried out by the officer after the customer requests a garbage pick-up, provided that the location of the garbage picked up is in the Kota Pari Village environment.

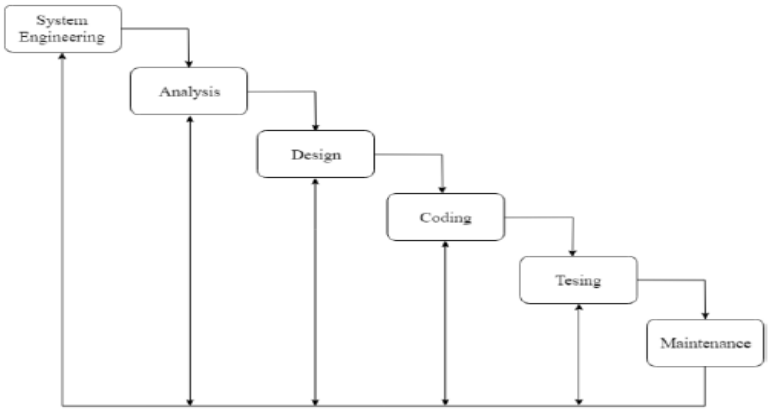
Therefore, a system is needed that can be used to record data digitally and can be accessed via the internet. This system can help the village government in managing data more effectively and efficiently, as well as make it easier for the village government to make policies and development plans that are in accordance with the needs of the population (Akbar et al., 2022)

Waste banks have developed in various regions in Indonesia(Ramadan et al., 2019). 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 (Wadly & Fitriani, 2023). In addition to existing MSMEs, the Kota Pari Village Waste Bank needs a waste bank management information system to make it easier to manage data and collect waste. The use of an information system in the waste bank can help the Pari City Village Waste Bank in managing data and waste collection so that the transaction process can run well. With the existence of this waste bank application, it is hoped that the community can easily participate directly in environmental issues and can make this application an additional income economically (Andriyanto & Wansen, 2020)

2. RESEARCH METHOD

2.1 Research Stages

The software development life cycle or abbreviated as SDLC is a methodology for designing, building, and maintaining information and industrial systems. So far, there are many SDLC models, one of which is the Waterfall model which consists of five phases that must be completed in sequence to develop software solutions(Bassil, 2012). 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 (Rizal et al., 2024). The waterfall model is the most widely used model for the development stage (Supiyandi et al., 2022). 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 (Farta Wijaya et al., 2022). 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:



Picture. 1 Metode Waterfall

Waterfall Methodology Explained:

1. The System Engineering stage is the initial part of the development of a software project. At this stage, all the needs for the implementation of the project are prepared. The prototype model approach can be

used if the user only defines the software in general, without detailing the input, processing, and output requirements in detail (Tallulembang et al., 2020).
2. Analysis, a stage where all aspects related to project creation or software development are examined. The goal is to understand the existing system, identify problems, and find solutions.
3. Design, this stage is the stage of translating the needs or data that has been analyzed into a form that is easy for the user to understand.
4. Coding, which is translating the designed data into a predetermined programming language.
5. Testing, is a test of a system or program after it has been created.
6. Maintenance, which is the implementation of the system as a whole accompanied by maintenance in the event of structural changes, both in terms of software and hardware.

2.2 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.

2.3 Data Collection Methods

The data collection methods used are observation and interview methods as primary data sources, and study literature as secondary sources

2.4 Data Processing Techniques Data Analysis

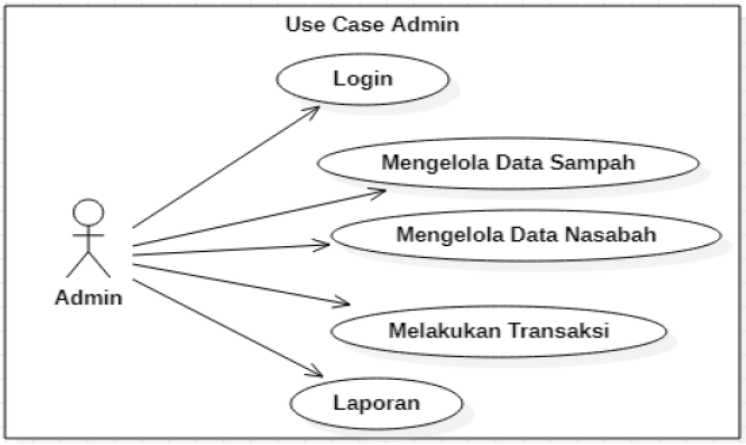
1) Data Processing
   a. Data reduction is reducing or sorting data that is in accordance with the topic on which the data is generated from research.
   b. Data coding is the adjustment of data obtained in conducting literature research and field research with the subject matter of the problem by giving a specific code code to each data.
2) 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 the results in the field and providing code so that the source of the data can be traced
3) 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 of Kota Pari Village. The following is the data on the list of waste that is managed.

Table. 1 List of Types of Waste

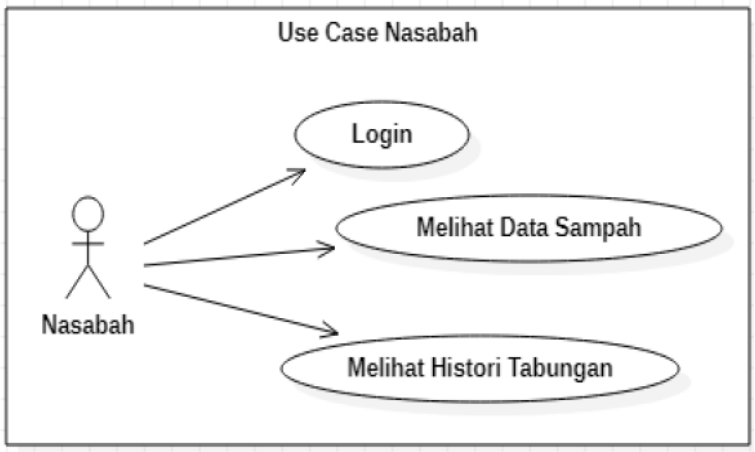
It	Types of Waste	Garbage Name	Price/Kg
1	Metal	Aluminum	5000
2	Metal	Brass	4500
3	Plastic	Bottle	4000
4	Kertas	Paralon	800
5	Kertas	Notebook	1800
6	Kertas	HVS	1900
7	Kertas	Newspaper	2000
8	Kertas	Magazine	650
9	Kertas	Box	1400

4) 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.

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

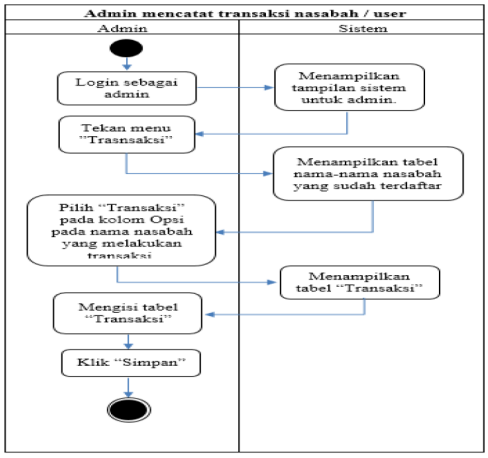


Picture. 2 Use Case Diagram Admin



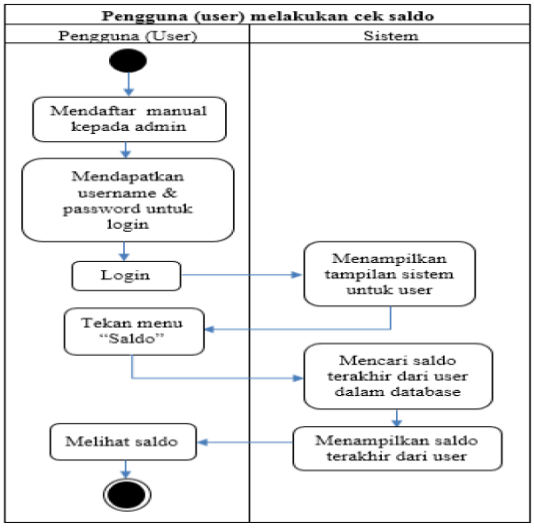
Picture. 3 Use Case Diagram Nasabah

6) Activity Diagram
a. Activity Diagram Admin



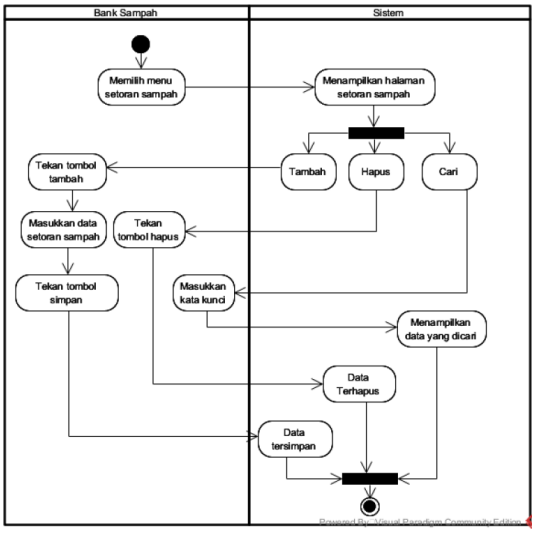
Picture. 4 Activity Diagram Admin

b. Activity User/Nasabah



Gambar. 5 Activity User

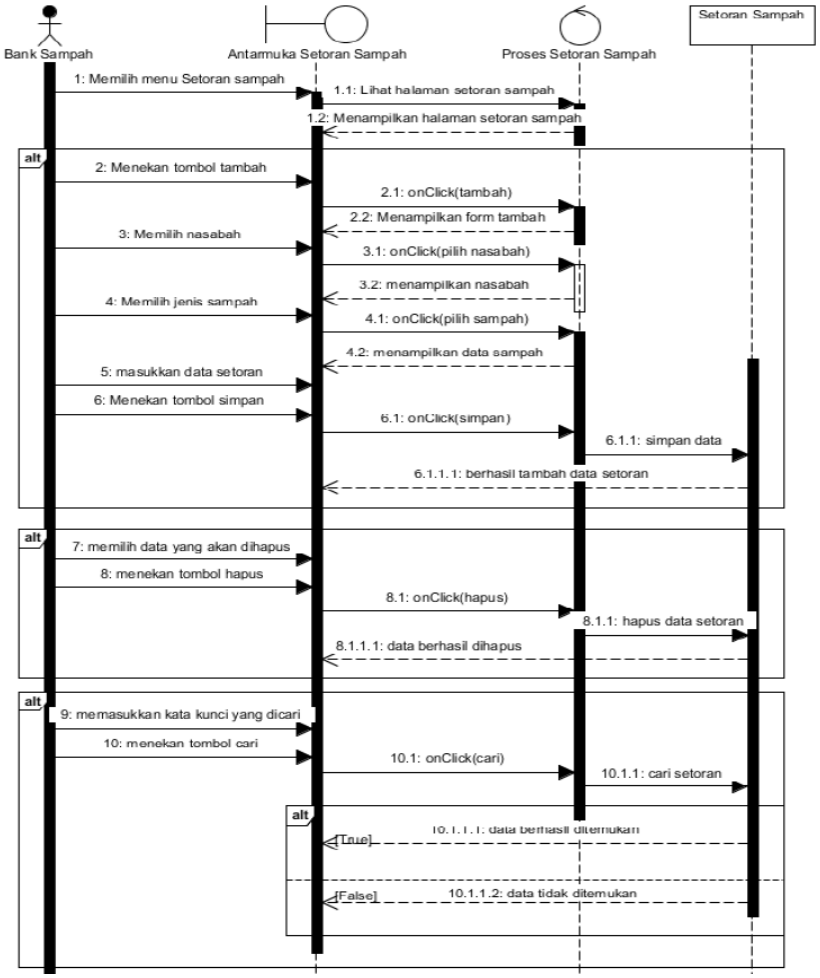
c. Garbage Deposit



Picture. 5 Activity Setoran Sampah

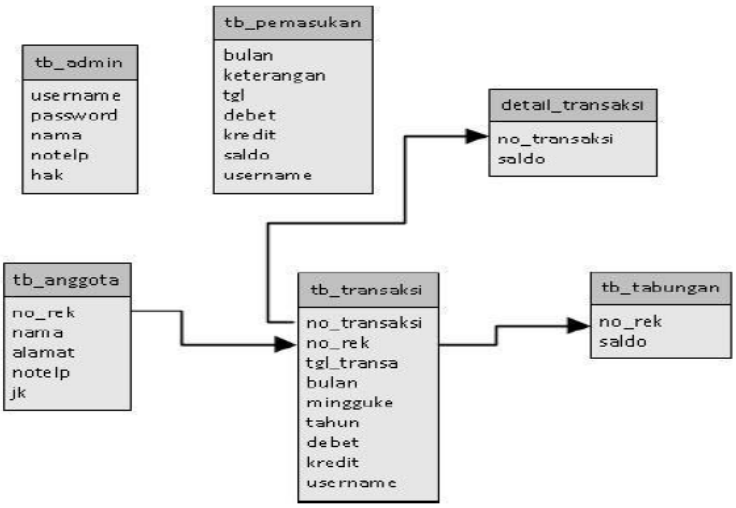
d. Sequence Diagram

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



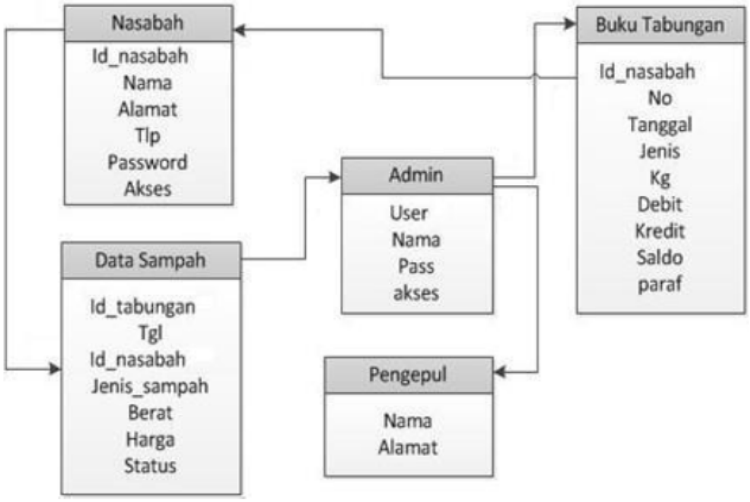
e. Database Design

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:



Picture. 6 Activity Setoran Sampah

f. Class Diagram



g. User Interface Design

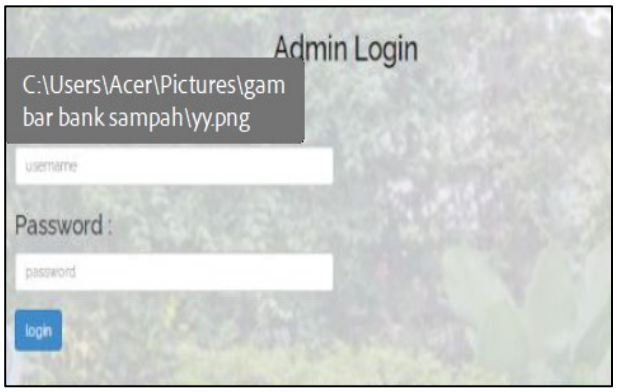
In the web-based waste bank information system application, there are several parts of the display that have different functions on each button. The functions of the buttons on each part of the display will be explained and can be seen in the following image:

a. Admin Login Page Display Design
b. Main Menu Display Design
c. Customer Menu Display Design
d. Garbage Type Menu Display Design
e. Customer Log Menu Display Design
f. Info Menu Display Design
g. Navigation Architecture Design'
h. Database Design

3. RESULTS

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, the author types http://localhost/banksampah/admin in 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

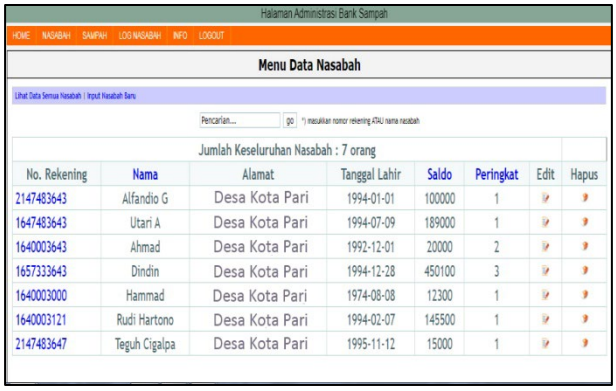


Picture. 7 Login Page

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

Picture. 8 Admin Page

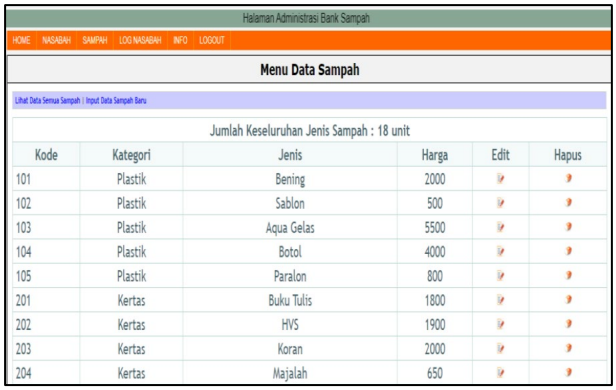
c. Customer Page
On this page, admins can see all customer data and can also add new customers



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		

Picture. 9 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



Picture. 10 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.

Picture. 11 Customer Log

3.1 Discussion

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

a. System Advantages
- This web-based waste bank information system application can make it easier for users to record customer data in the waste bank.
- 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.

b. System Disadvantages
- This application can only be accessed by admins from the waste bank.
- Waste bank activities can only cover the Pari City Village environment.

4. CONCLUSION

The Kota Pari Village Waste Bank system has been tested and provides several important benefits. This system eliminates the need to use paper, so that the administrative process becomes more efficient. Customer data and transactions are stored securely in the system, reducing the risk of data loss or damage. In addition, the system makes it easier for officers to compile reports, especially for collection needs to collectors, so that the process is faster and more effective.

For customers, this system provides easy access to balance information through the passbook without having to come directly to the waste bank. This supports user convenience and increases community

participation. Furthermore, the implementation of the waste bank system also helps create a cleaner environment by managing waste systematically and economically.

The existence of this system has a significant added value, namely providing economic benefits for the community and encouraging the progress of the local environment. With more organized management, the Kota Pari Village Waste Bank can be a sustainable solution that supports joint development, both in terms of social, economic, and ecological. This system not only makes it easier to manage, but also creates a positive impact on the local community.

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