

New Normal Waste Bank Information System in Medan City Using the Waterfall Method

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ABSTRACT

Waste banks are one solution for community-based waste management, where collected waste can be recycled and has economic value. However, manual waste bank management often faces challenges such as inefficient transaction recording, unintegrated data, and difficulties in managing customer data. Therefore, an information system is needed to address these issues.

This study aims to design and develop a Waste Bank Information System using the Waterfall Method. The Waterfall Method was chosen because of its systematic and structured approach, making it suitable for software development with clear requirements from the outset. The outcome of this research is an information system that simplifies the process of managing waste bank data, including customer registration, transaction recording, and automated and structured report generation. This system also enhances the operational efficiency of waste banks by accelerating recording processes and reducing the potential for errors.

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INTRODUCTION

A waste bank is a place used to collect sorted waste. Waste is a consequence of human activity. Waste management has become an important issue due to the increase in the amount of waste produced by modern human populations. It is important to understand that proper waste management is key to protecting the environment and human health. Sustainable waste management practices involve actions such as waste sorting, recycling, waste reduction, safe disposal, and reusing items that are still usable. In this way, we can reduce the negative impact of waste on the environment and support sustainability.

The New Normal Waste Bank is a waste collection institution located in the area of Gg. Mekar Mulyo, Jl. Ring Road No. 18, Tj. Sari, Kec. Medan Selayang, Kota Medan, North Sumatra 20132. The New Normal Waste Bank has been operating since 2011 and continues to do so to this day. Law No. 18 of 2008 on Waste Management emphasizes the need to shift from conventional waste management practices to a waste management approach focused on reduction and proper handling of waste. Waste reduction can be achieved through activities such as limiting waste generation, recycling, and reusing waste, known as the 3R (Reduce, Reuse, and Recycle). The implementation of 3R activities in the community is still hindered, primarily due to the lack of public awareness about waste sorting.

With the establishment of the New Normal Central Waste Bank, the community can collect household waste as well as waste found in the environment. It is important to note that there are various types of waste that can be deposited at the waste bank, such as clean Asoy, gallon caps, HVS, duplex, clean transparent PE, mante/ale-ale, books, cardboard, black PE, Yakult, tubes, magazines, cans, aluminum, bottle caps, plastic packaging, and more. This waste is then collected and weighed at the waste bank, and participants can receive a savings book, which can later be cashed out and used to purchase household items or other necessities (Claudia, 2016).

After conducting research at the research site, it was found that at the new normal waste bank, officers faced difficulties in terms of customer data collection, transaction recording, and reporting because they were still using manual methods without the aid of computers. These processes, which were carried out manually with paper records, posed challenges in terms of complex bookkeeping and

were prone to damage or loss, causing stress for managers. Therefore, the ongoing research aims to develop a web-based information system for the main waste bank in the new normal. This system will be built using the Waterfall method and the PHP programming language, with MySQL as the database, intended to improve efficiency and accuracy in managing customer data, transactions, and bookkeeping within the waste bank environment.

In the context of developing the “New Normal Central Waste Bank Information System for the City of Medan using the Waterfall Method,” there are three main points that are the focus of the research problem formulation:

1. How to apply efficiency in the management of sorted waste at the new normal central waste bank in the city of Medan to maximize its overall benefits?
2. How to manage customer data and transactions accurately and effectively to improve data collection, transaction recording, and reporting processes at the waste bank?
3. How to enhance the existing information system to support more effective, efficient, and sustainable waste management at the New Normal Central Waste Bank of Medan City through the implementation of waste sorting?

METHODS

The research method used is the Waterfall method. The Waterfall method is a linear and structured approach to software development. This method consists of a series of development stages carried out sequentially, with each stage dependent on the completion of the previous stage.

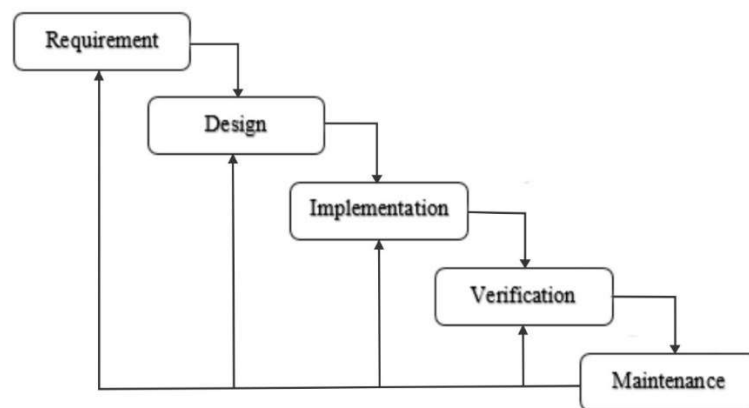


Figure 1. Model Waterfall

The Waterfall Model involves a series of sequential actions in developing a system so that it becomes a website that is ready to be used by Bank Sampah. In this waterfall model, there are stages that must be passed by the author, namely:

1. Requirements Analysis

At this stage of system analysis, the focus is on understanding and documenting the requirements of the system to be developed. The author conducts an analysis of the system, software, methods, and models that are suitable for use in this e-commerce project. The project team interacts with stakeholders to identify and document functional and non-functional requirements. Using a MySQL database, the front end uses HTML and CSS with a framework, while the back end uses the PHP programming language.

2. Design

Once the requirements have been gathered, the project team designs the system structure. This includes system architecture design, database design, user interface design, and software component design.

3. Implementation (Implementation)

This stage involves coding or implementing the software based on the design that has been created previously. The code is generated and tested at the unit level (unit testing) to ensure that each component functions according to the specifications.

4. Testing

After implementation, the system is thoroughly tested to ensure that all components are working properly and according to requirements. Testing involves unit tests, integration tests, system tests, and user acceptance tests.

5. Implementation and Maintenance After successful testing, the system is deployed in the production environment. Next, system maintenance and upkeep are carried out, including bug fixes, performance improvements, and ongoing updates.

RESULTS AND DISCUSSION

Results and Implementation contains the results of the system interface that was built and the tests that were conducted to determine whether the system runs according to user requirements. Below is a screenshot of the New Normal Waste Bank information system website.

1. Landing page

Figure 2 shows the initial landing page of the New Normal Waste Bank website. In this section, users who already have an account can directly select the log in menu, while users who do not yet have an account can register first in the registration menu in order to access the services of the New Normal Waste Bank website.



Figure 2. Landing Page

2. Customer Registration Page

The customer registration page is used as a medium for registering new customer accounts. Customers can log in with their registered username and password, as shown in Figure 3.

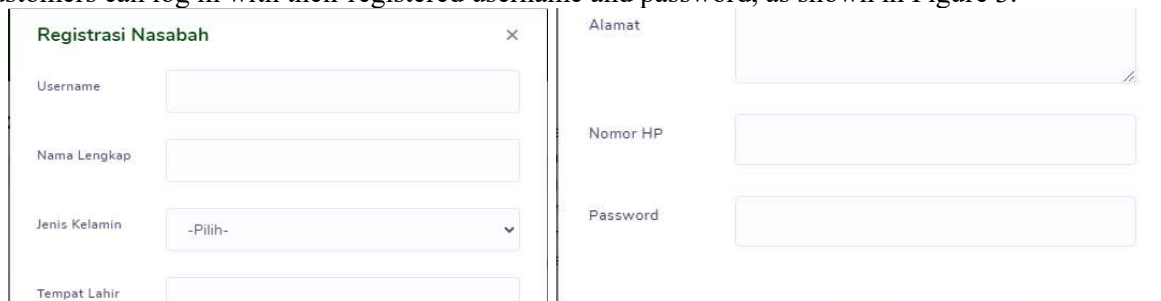


Figure 3. Customer Registration Page

3. Login Form

After registering, users can switch to the login menu by entering their registered username and password, then users can enjoy the services provided by the New Normal Waste Bank website, as shown in Figure 4.



The login form features the Bank Sampah New Normal logo at the top center. Below it are two input fields: 'Username' containing the text 'megawati' and 'Password' with six dots. A green 'Login' button is positioned at the bottom.

Figure 4. Login Form

4. Main Admin Page

The admin main page contains menus that can be used to display other pages related to the system that can be seen in Figure 5.

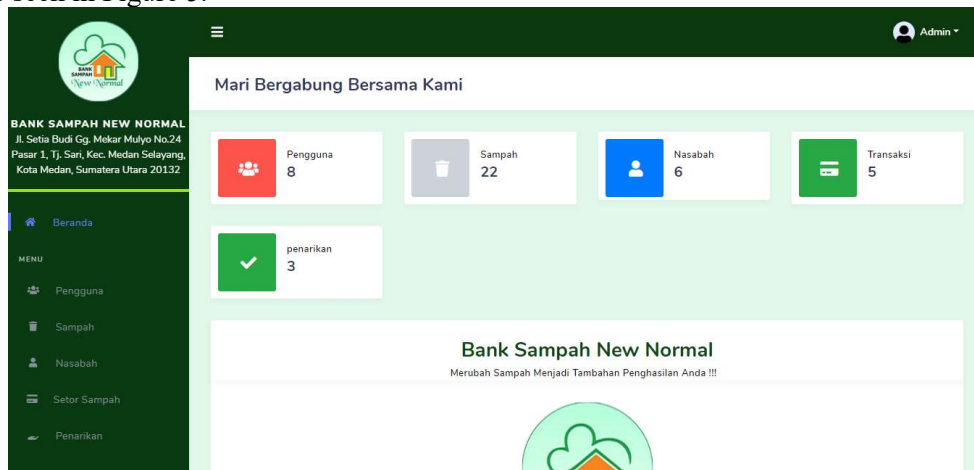


Figure 5. Main Admin Page

5. Customer's main page

The customer's main page contains a menu that can be used to display other pages related to the system that can be seen in Figure 6.



Figure 6. Customer's Main Page

6. Main Page Chairman

The main page of the chairperson contains a menu that can be used to display other pages related to the system that was built, as shown in Figure 7.

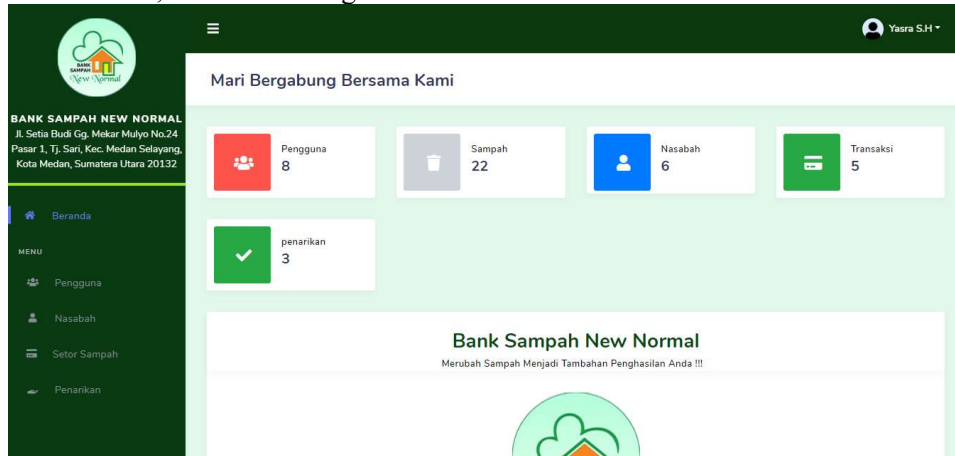


Figure 7. Main Page Chairman

7. User Page

The user page contains user data that will be used to access the system, as shown in Figure 8.

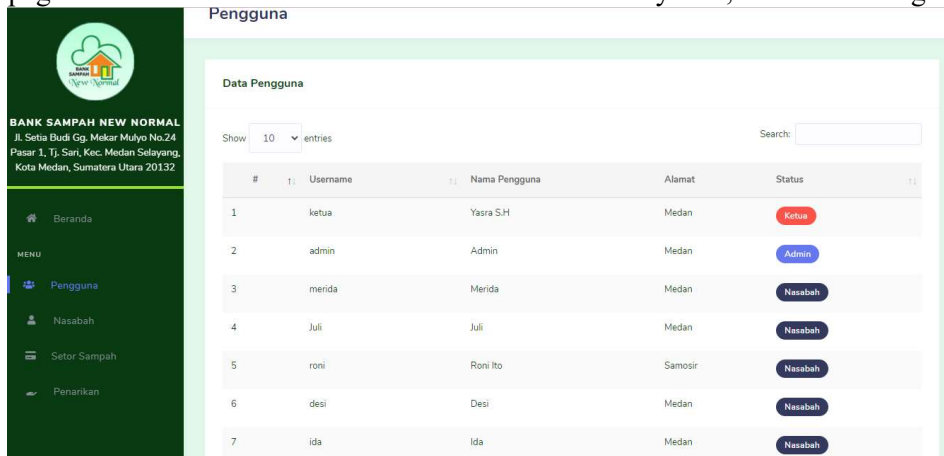


Figure 8. Main Page Chairman

8. Add User Page

The add user page is used to add new users who can access the system, as shown in the image 9

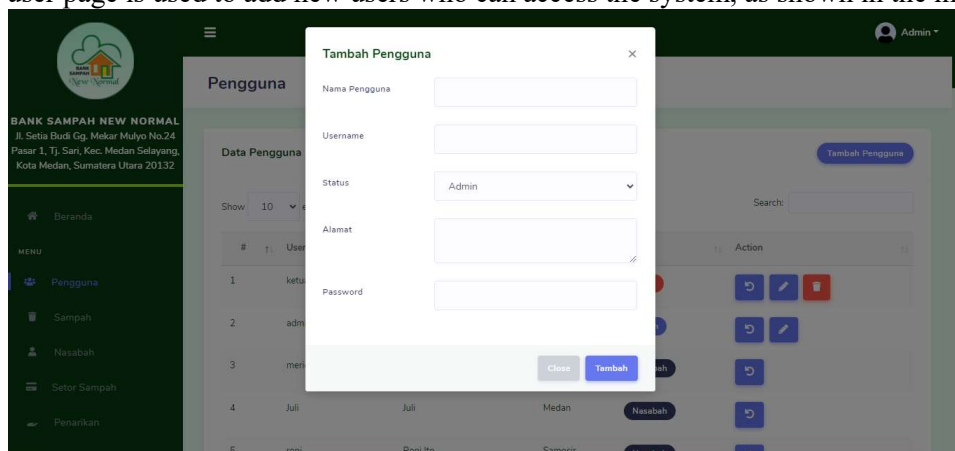


Figure 9. Add User Page

9. Waste Type Page

The waste type page displays a list of waste types on the New Normal Waste Bank website, which can be viewed by managers and customers before depositing waste. This service provides information on waste prices based on type and weight, which can be seen in the image 10.

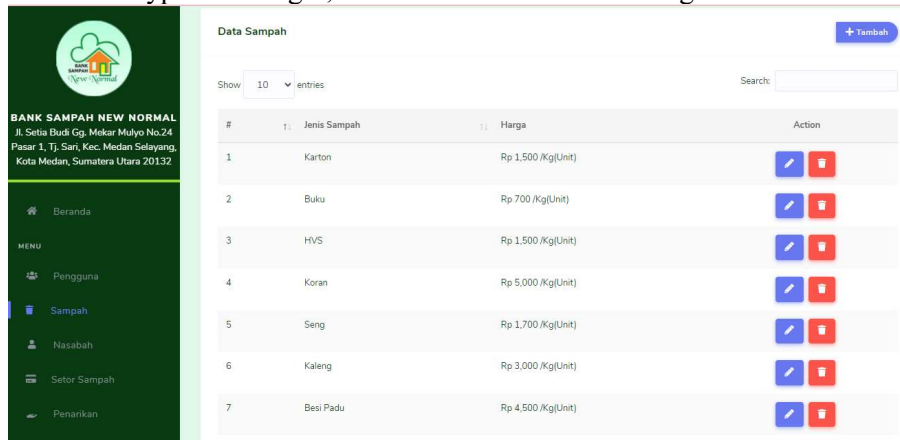


Figure 10. Waste Type Page

11. Customer Page

The customer page contains customer data, as shown in the image 11.

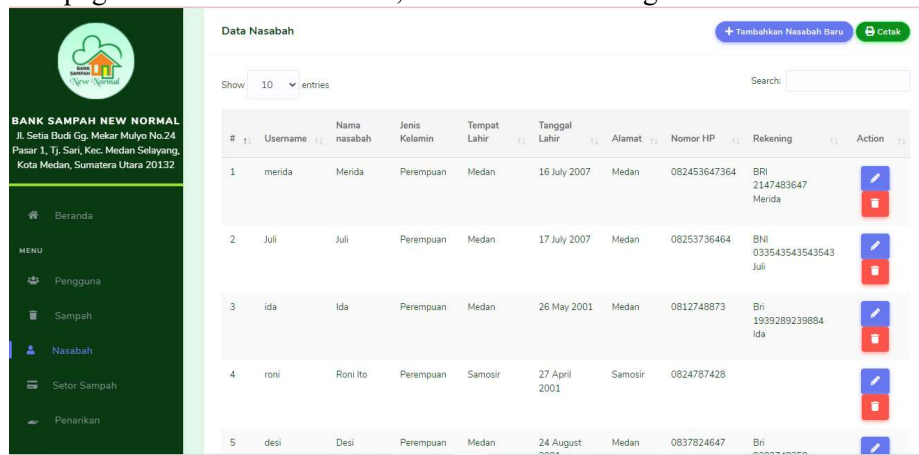


Figure 11. Costumer Page

13. Transaction Page

The transaction page contains data on waste deposit transactions from customers. This data is used by the admin to view waste deposit transactions, as shown in the image 12.

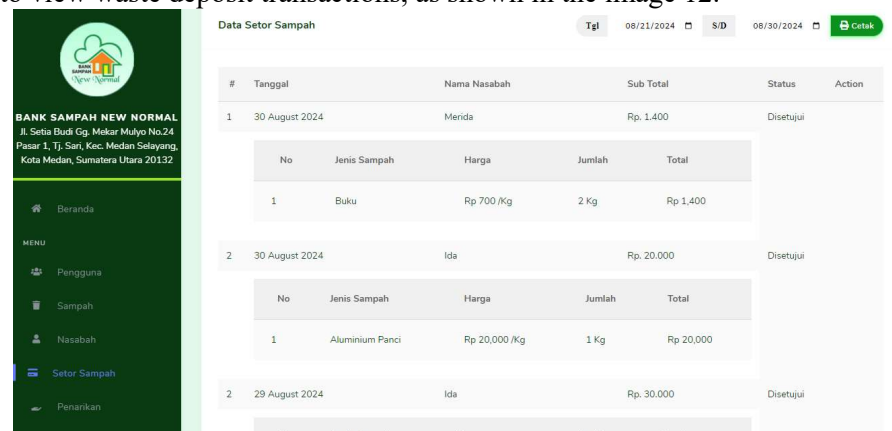


Figure 12. Transaction Page

15. Withdrawal Page

The withdrawal page contains balance withdrawal data. This data is used by the admin to view the balance withdrawal history, which can be seen in the image 13.

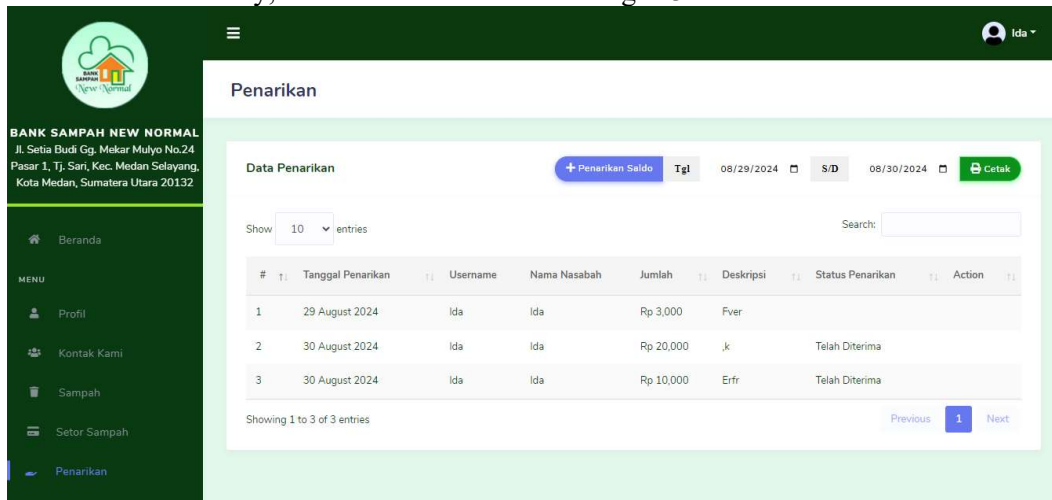
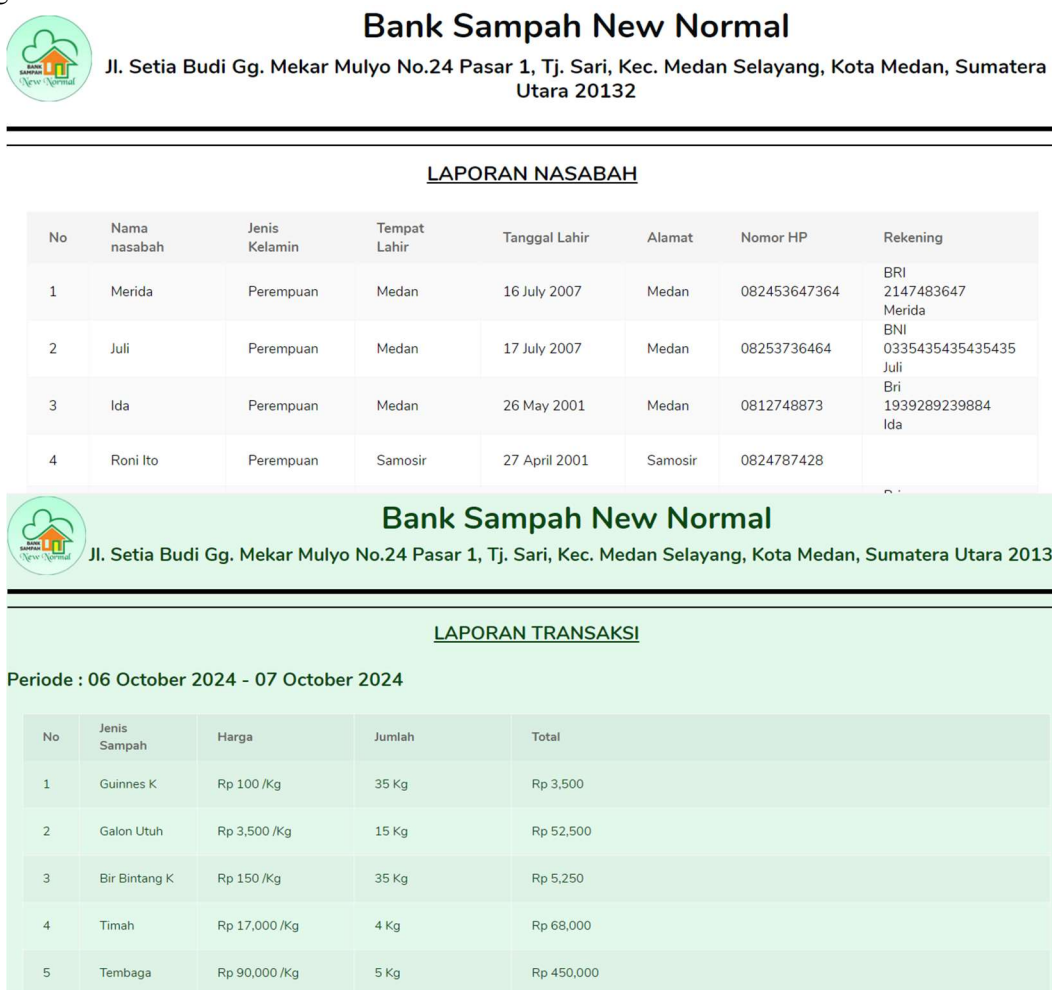


Figure 13. Transaction Page

17. Customer Reports, Transactions, Withdrawals

Customer reports Transactions, Withdrawals are reports that display customer data, as shown in the image 14.



Bank Sampah New Normal				
Jl. Setia Budi Gg. Mekar Mulyo No.24 Pasar 1, Tj. Sari, Kec. Medan Selayang, Kota Medan, Sumatera Utara 20132				
LAPORAN PENARIKAN				
Periode : 06 October 2024 - 07 October 2024				
No	Tanggal Penarikan	Nama Nasabah	Deskripsi	Jumlah
1	07 October 2024	Surya Darma	.	Rp 50,000
2	07 October 2024	Megawati Purba	.	Rp 100,000
3	07 October 2024	Leo	.	Rp 200,000
4	06 October 2024	Leo	.	Rp 50,000
Total				Rp 400,000

Figure 14. Customer Reports, Transactions, Withdrawals

CONCLUSION

Based on the description and explanation of the design of the “New Normal Waste Bank Information System for the City of Medan Using the Waterfall Method,” several conclusions can be drawn, such as: With the Waste Bank Information System, the waste management process becomes more efficient, especially in terms of data collection, transaction recording, and reporting. This system reduces manual errors and simplifies the operational management of the waste bank. The information system that has been developed allows for easier and faster access to customer data, transactions, and waste management. This supports better decision-making. With the information system, transactions carried out by customers at the waste bank become more transparent and accurate. Automatic recording reduces the potential for errors and increases customer trust in the system.

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