Design and Implementation of the "Trash Into Cash" System as a Digital Solution for Waste Management Economically Valuable Recycling

Della Sari, Hanna Willa Dhany, Hendry

Abstract

Problems waste management is still become issue major in various regions, especially in the management of recycled waste that has economic value. Waste banks as a conventional solution Still facing obstacles in recording transactions, customer data management, and transparency The economic value of the deposited waste. This study aims to design and implement a web-based information system called Trash Into Cash as a digital solution in managing recycled waste with economic value at waste banks. The research method used is the Waterfall method, which consists of from stages needs analysis, system design, implementation, testing, and maintenance. The system built is capable of managing customer data, waste types, and transactions. weighing, conversion waste value becomes balance, as well as report real-time waste management. The research results show that the Trash Into Cash system can increase efficiency data management, minimizing error recording, as well as increase transparency and participation community in managing recycled waste.

Keywords: Information System, Waste Bank, Trash Into Cash, Waterfall, Waste Management

Della Sari[1]
[1]Computer System Study Program, Universitas Pembangunan Panca Budi, Indonesia
e-mail: dellasari920@gmail.com[1]

Hanna Willa Dhany[2], Hendry[3]
[2,3]Computer System Study Program, Universitas Pembangunan Panca Budi, Indonesia
e-mail: hdhany@dosen.pancabudi.ac.id[2], hendry@dosen.pancabudi.ac.id[3]
2nd International Conference on Islamic Community Studies (ICICS)
Theme: History of Malay Civilisation and Islamic Human Capacity and Halal Hub in the Globalization Era
https://proceeding.pancabudi.ac.id/index.php/ICIE/index

Introduction

Waste management is one of the problem continuous environment increase along with the growth of population and community activities. Waste that is not managed properly can cause various impact negative, such as pollution environment, disturbance health, and decline quality of life of the community. On the other hand, most waste, especially inorganic waste, has the potential to be recycled and has economic value if managed properly.

Waste banks are present as an innovation social activities that aim to educate community in sorting waste while providing added economic value. However, in practice, waste bank management is still Lots done manually, starting from recording customer data, weighing waste, to calculation economic value. This causes low efficiency, high risk error recording, as well as lack of transparency in data management.

The development of information technology, especially web- based information systems, provides opportunities to improve effectiveness Waste bank management. Information systems enable data management processes to be integrated, accurate, and easily accessible. Therefore, a digital system capable of managing waste is needed. the entire waste bank process is systematic and transparent.

This study proposes Design and implementation of a web- based Trash Into Cash system as a digital solution for managing economically valuable recyclable waste. This system is expected to can help waste bank managers to manage data efficiently, improve transparency transactions, as well as push participation active community in waste recycling activities.

Literature Review

Waste Management and Waste Banks

Management rubbish is a series activities that include collection, sorting, transportation, processing and processing end waste management trash that is not organized with Good can cause various problem environment and health. One of the evolving approach in management rubbish is draft waste bank, which adopts 3R principle (Reduce, Reuse, Recycle).

Garbage bank functioning as means education and empowerment public in sorting rubbish at a time give mark economy from collected waste. Waste deposited by the community will weighed, recorded, and converted become mark savings. However, the management of the waste bank in a way conventional Still face various obstacles, such as manual recording, limitations reports, as well as lack of transparency transactions.

Information System in Waste Bank Management

System information is combination from device hard, device software, procedures, and resources Power functioning human For process data Into useful information in taking decision. Implementation system information in waste bank management aim For increase efficiency, accuracy, and transparency of data.

A number of study previously show that system information web -based capable help waste bank management in customer data recording, management type trash, transactions weighing, as well as manufacturing report in a way automatic. System web -based also allows real -time data access by managers and other parties related, so that can increase trust and participation public.

The “Trash Into Cash” Concept

Draft Trash Into Cash is approach management trash that changes rubbish recycling repeat become source mark economics. Concept This emphasize on sorting rubbish since from the source as well as conversion rubbish become balance or income for society. With existence digital systems, conversion processes mark rubbish become balance can done in a way automatic and transparent.

Implementation draft Trash Into Cash through system information web -based allows transaction data management in a way structured, starting from recording type trash, heavy

garbage, price per kilogram, up to accumulation balance customers. This is expected can increase motivation public For participate active in management rubbish recycling repeat.

Web-Based Information System

System information web -based is accessed system through internet network using a browser without need installation specific to the device users. Advantages system web - based including convenience access, flexibility, and convenience in maintenance and development system. In context of waste bank, system web -based allows manager For do data management centralized and integrated. In addition that, society as customers can monitor balance and history transaction in a way independent, so that increase transparency and accountability waste bank management.

Waterfall System Development Method

Waterfall method is one of the method development a system that is systematic and sequential. Stages in Waterfall method includes analysis needs, design system, implementation, testing, and maintenance. Each stages must completed before continue to stage next.

Waterfall method is chosen in study This Because in accordance For development system with needs that have been defined with clear since beginning. With approach this, development system Trash Into Cash can done in a way structured and documented with Good.

Research Methodology

Types and Approaches of Research

Study This use approach engineering device software engineering with objective design and implement system information management rubbish recycling repeat worth economy web -based on waste banks. The approach used nature descriptive and development system, namely describe need system as well as implement it in form applications that can used by waste bank managers.

System Development Methods

Method development the system used in study This is Waterfall method. The Waterfall method is a development model device software that is done in a way sequentially and systematically, where each stages must completed moreover formerly before continue to stage next.

Needs Analysis

Stage analysis need aim For identify need the system that will built. At this stage This done data collection through observation and interviews with waste bank managers. Needs identified systems covering customer data management, types trash, transactions weighing, conversion mark rubbish become balance, as well as manufacturing report.

System Design

Stage design system done based on results analysis needs. Design covering design architecture system, database design, as well design interface user. At this stage This used modeling system such as use case diagrams, entity relationship diagrams (ERD), and design system process flow For ensure the system being built in accordance with need user.

Implementation

Stage implementation is stage translation design system to in form program code. System Trash Into Cash developed as system information web -based with use Language appropriate programming and database. At this stage This all over feature system implemented, including

customer data management, transactions garbage, calculation balance, as well as report management rubbish.

Testing

Stage testing done for ensure that system walk in accordance with needs and freedom from error functional. Testing done use method black box testing, namely with test every function system based on the input and output produced. Test results used for ensure that all over feature system can used with both by the waste bank managers.

Maintenance

Stage maintenance done after system implemented and used by users. Stage This aim for repair errors found after system used as well as do adjustment If there is change need user. Maintenance ensure system Trash Into Cash still walk optimally and sustainably.

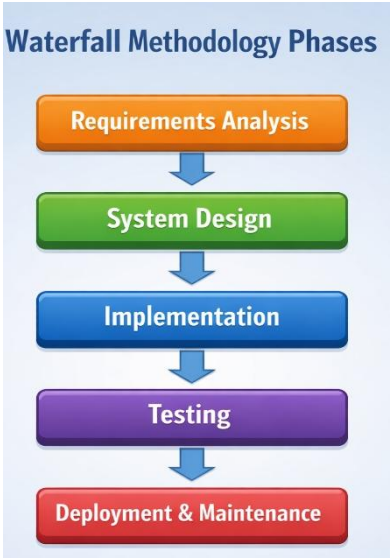


Figure 1. Stages Method

Description General System

System Trash Into Cash is system information web -based designed for help waste bank management digitally. System This allows waste bank manager in managing customer data, types trash, transactions weighing, conversion mark rubbish become balance, as well as compilation report in a way integrated and real-time.

Use Case Diagram

Admin has right access full to system, whereas customers only can access information related to personal data, balances, and transactions. All activity transaction carried out by admin based on waste deposited by customers.

Figure 2. Use Case Diagram

Entity Relationship Diagram (ERD)

Entity Relationship Diagram (ERD) is used for describe connection between entity in the system database Trash Into Cash.

Relation between entity Customers and Transactions nature one-to-many, where one customer can have many transactions. Likewise, relations between Trash_Type and Transactions.

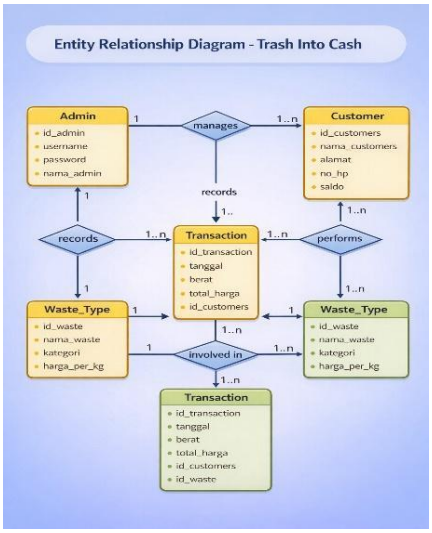


Figure 3. Entity Relationship Diagram (ERD)

Results

Based on the results of the design and implementation of the Trash Into Cash system, it has been successful. built a web -based information system that is able to support the waste management process to become economic value in a structured, efficient, and computerized manner. This system is designed to facilitate admin data management, customers, types of waste, transactions deposits, as well as withdrawal integrated balance.

The system provides login and account registration pages that function as mechanisms. security to limit access according to user rights. There is two admin types, namely the main admin who has full access to all data and system features, as well as admins/ officers who have limited access according to their operational duties.

On the data management side, the system provides a trash data page which is used to record type of waste, category, and price per kilogram. This data becomes reference main in the transaction process waste deposit. The system is also capable of producing waste data report that can printed for use documentation and evaluation.

Feature transaction The waste deposit allows the admin to record the deposit data made by customers, including the weight of the waste and the total value obtained. Each successful transaction noted will automatically add balance customers. In addition, the system provides report printing facility waste deposit as a form transparency and data archiving.

For customer financial management, the system provides a transaction page. pull balance used to record the withdrawal process balance by the customer. This withdrawal data is stored in the database and can be displayed in the form report withdrawal balance ready to print.

From the user side Customers, the system provides a special customer page that displays balance information, history deposits and history withdrawals. In addition, customers can also directly contact the admin via WhatsApp which is integrated Into the system for transaction purposes. consultation, scheduling of waste collection, or procedures deposit.

Overall, the results of the implementation show that the Trash Into Cash system is able to increase efficiency data management, minimizing error manual recording, as well as increase transparency transaction between admin and customers. This system also provides easy access to information for all users and support more modern and sustainable waste management processes.

1. Login Page

The login page is used as the initial gateway for users to access the system. Users are required to Enter a valid username and password to enter the system according to your respective access rights.

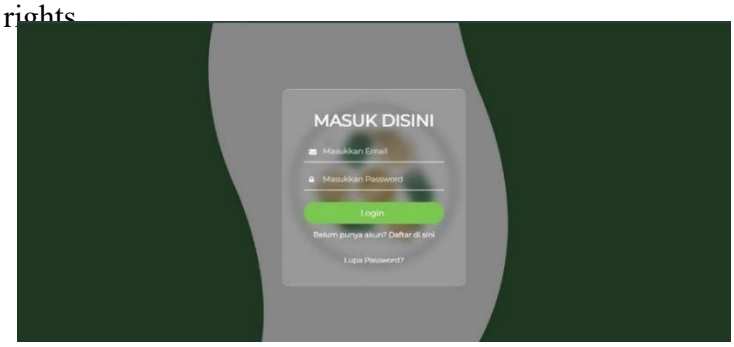


Figure 4. Login Page

2. Account Registration Page

The account registration page is for registration. new user. On this page, users fill in the necessary data to have an account and use the Trash Into Cash system.

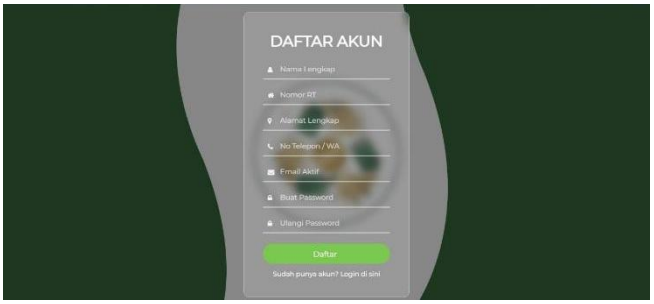


Figure 5. Account Registration Page

3. Master Admin Page

The master admin page is the page with the highest access rights. The main admin can manage all data in the system, such as admin data, customer data, waste data, and all over transactions that occur.

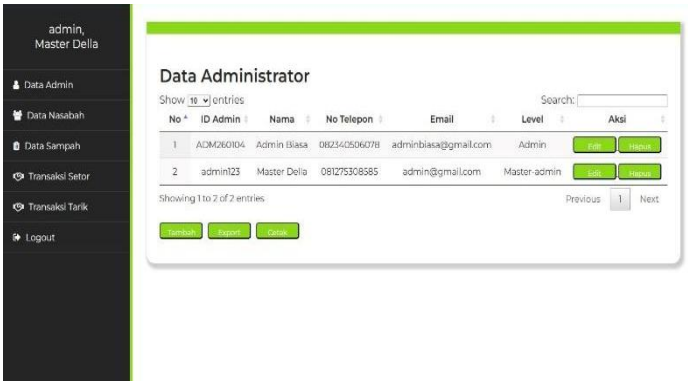
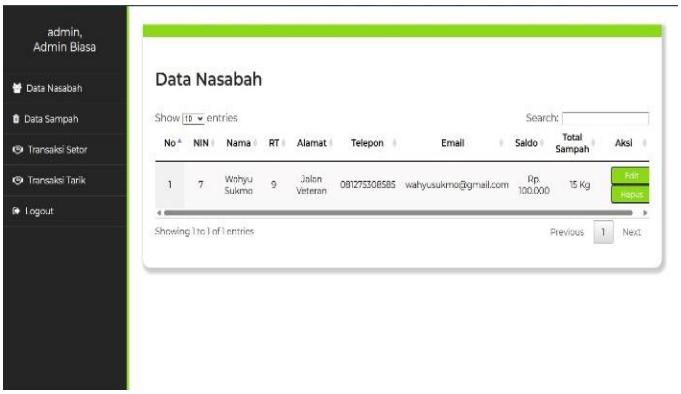


Figure 6. Master Admin Page

4. Admin/ Officer Page

Admin or officer page used by officers field to carry out operational activities, such as recording transaction waste deposit and withdrawal balance, without having full access like



master admin.

Figure 7. Admin/ Officer Page

5. Trash Data Page

The waste data page is used to manage information on the types of waste received, including the name of the waste, category, and price per kilogram. This data becomes reference in the calculation process transactions.

Figure 8. Trash Data Page

6. Print Waste Data Report

This page is used to display and print waste data reports stored in the system as documentation and evaluation material.

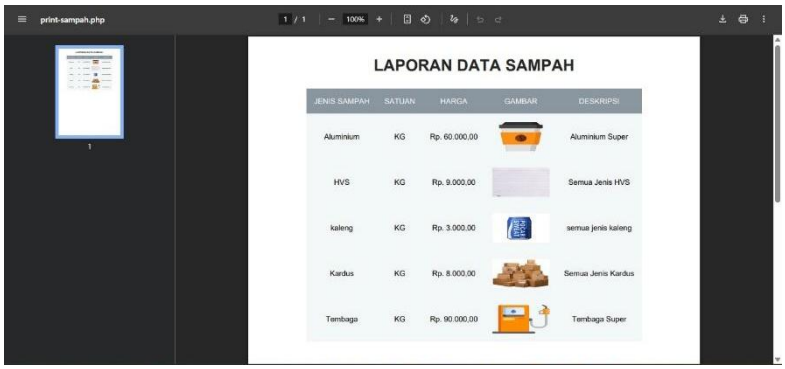


Figure 9. Print Waste Data Report

7. Transaction Page Garbage Deposit

Transaction page The waste deposit system is used to record the waste deposit process by customers. The system automatically calculate the total price based on the weight and type of waste.

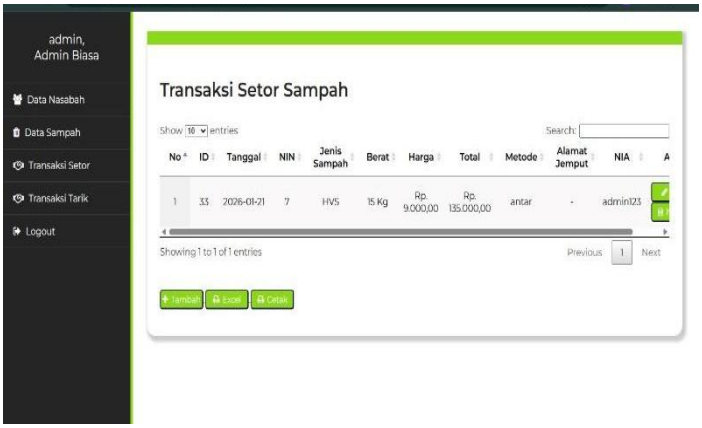


Figure 10. Transaction Page Garbage Deposit

8. Trash Deposit Page

The waste deposit page displays details of the waste deposit process carried out by customers, including information on weight, type of waste and value. transactions.

Figure 11. Trash Deposit Page

9. Withdraw Balance Transaction Page

Transaction page pull balance used to record the withdrawal process balance by the customer. The system ensures the balance sufficient before the transaction is processed.

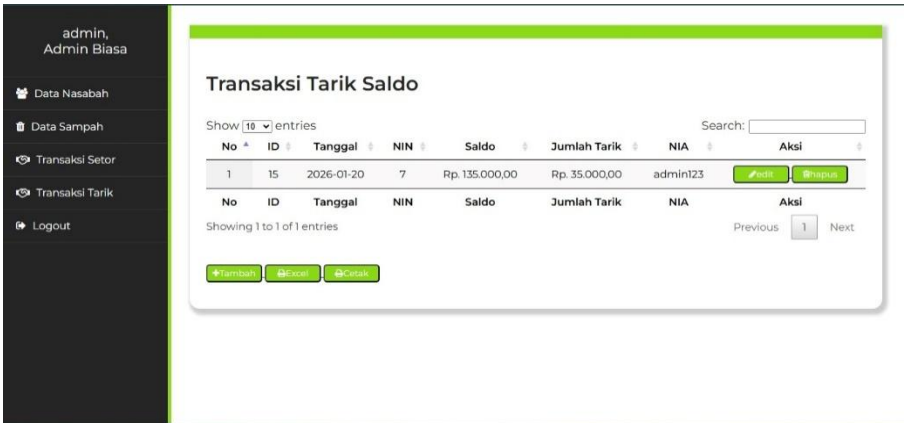


Figure 12. Withdraw Balance Transaction Page

10. Withdraw Balance Page

Pull page balance display withdrawal details balance customers that have been made and stored in the system database.

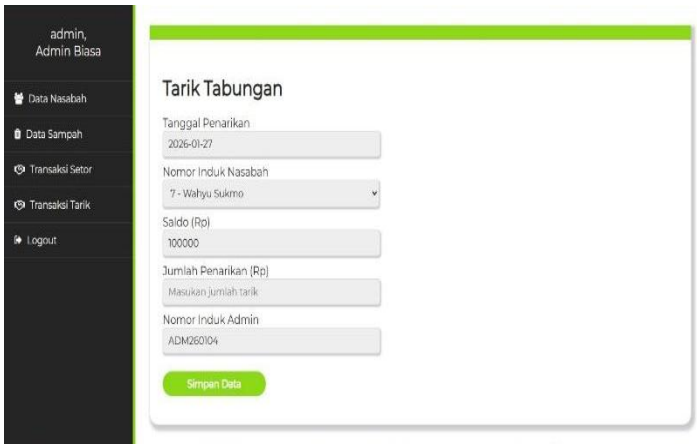


Figure 13. Withdraw Balance Page

11. Withdrawal Data Balance

This page is used for printing report withdrawal balance customers as archives and proof of transactions.

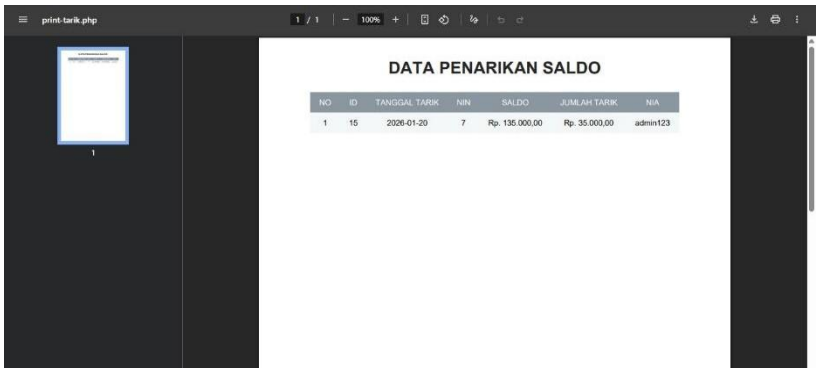


Figure 14. Print Withdrawal Data Balance

12. Waste Deposit Data

The waste deposit data print page functions to display and print report transaction waste deposits that have been made by customers.

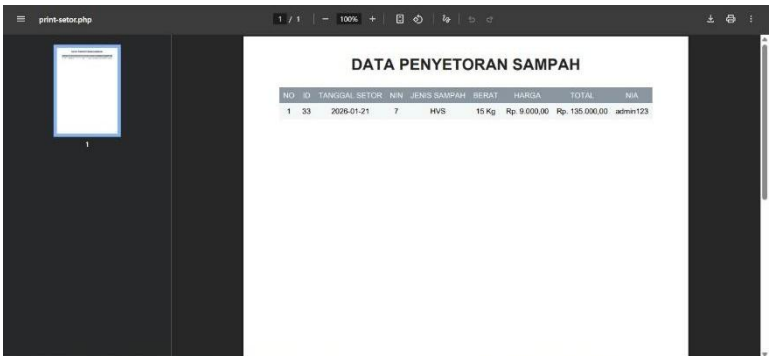


Figure 15. Print Waste Deposit Data

13. Customer Withdrawal History Page

History page pull customers display history withdrawal balance that has been carried out by the customer as a form of transparency transactions.

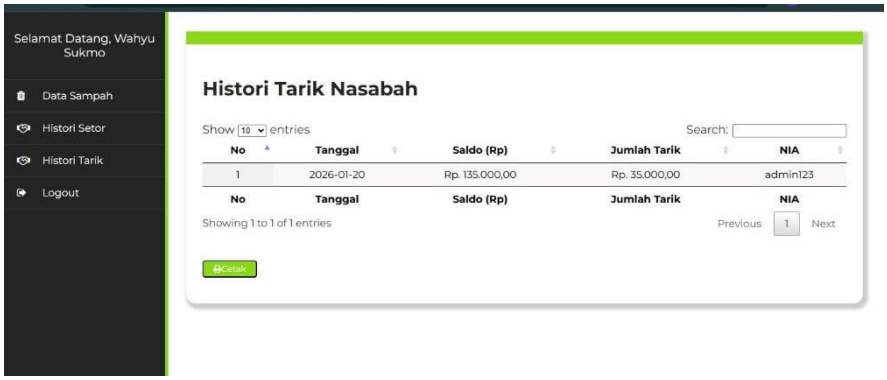


Figure 16. Customer Withdrawal History Page

14. Home Page

Home page is a dashboard page that displays summary of system information, such as number of customers, total transactions, and navigation menus main.

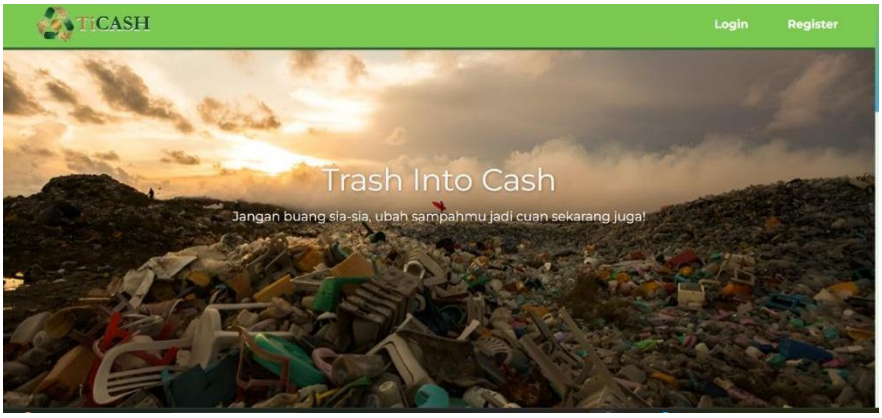


Figure 17. Main Page

Black Box Testing

Testing system done use method Black Box Testing For ensure all over function main on the system Trash Into Cash walk in accordance with need user. Testing done with provide certain inputs and observe the resulting outputs without notice internal structure of the system.

Table 1. Black Box Testing

No	Feature	Scenario	Expected results	Results
1	Login	Valid data	Successfully logged Into the system	Succeed
2	Login	Invalid data	An error message appears	Succeed
3	Manage Data	Add/Edit data	Data is stored correctly	Succeed
4	Garbage Data	Input waste type	Garbage data stored	Succeed
5	Garbage Deposit	Transaction input deposit	Balance customers increase	Succeed
6	Withdraw Balance	Valid withdrawal	Balance reduce	Succeed
7	Withdraw Balance	Insufficient balance	Transaction rejected	Succeed
8	Report	Print report	Report can printed	Succeed
9	History Customer	Look history	Historical data come on stage	Succeed

No	Feature	Scenario	Expected results	Results
10	Logout	Exit system	Return to login page	Succeed

Conclusion

Based on the results of the design, implementation and testing that have been carried out, it can be concluded that the web- based Trash Into Cash system is successful built and able to meet data and transaction management needs computerized waste processing. This system facilitates admin data management, customers, types of waste, transactions deposits, as well as withdrawal integrated balance. Results testing using the Black Box Testing method shows that all over function The main system runs well and meets user needs. The system is able to improve efficiency data recording, minimizing errors that often occur in manual processes, as well as increase transparency and accuracy transactions. With the Trash Into Cash system, the waste management process becomes more effective and makes it easy for customers to monitor balance as well as history transactions. Therefore, this system is stated suitable for use as a technology- based waste management solution that supports the concept of a circular and sustainable economy.

References

[1] Annatasya, S., Febrina, O., Riaudan, E., Zahra, QA, Ivana, V., Wardani, &, Luhur, MA (2024). Life more friendly environment with reduce pocket plastic on the coast Lampung Bay. Journal Devotion To Society, 3(2), 1–6. https://doi.org/10.23960/jmw.v3i2.48

[2] Atin, S., Mutia, S., Widayanti, A., Yatawa, HS, Rafdhi, AA, & Afrianto, I. (2022). Design system waste bank information website based. Indonesian Journal on Information Systems, 7(1), 59–70. https://doi.org/10.36549/ijis.v7i1.194

[3] Fathasya Meyra Arliansyah, & Bahtiar, A. (2024). Implementation application waste bank savings Web -based research at the Indah Makmur Waste Bank, Cirebon Regency. Journal Scientific Management Informatics and Computers, 8(1), 26–34. https://doi.org/10.32485/kopertip.v8i1.241

[4] Gulo, JAS, Dhany, HW, & Panjaitan, MS (2025). System information website -based personnel management at PT Anugrah Argon Medica. Journal Information Polgan, 14(1), 392–401. https://doi.org/10.33395/jmp.v14i1.14737

[5] Izhari, F., Dhany, HW, Davy, M., & Saragih, A. (2024). Design system information application drug data processing at the Community Health Center make use of the website. Proceedings Economic, Social Science, Computer, Agriculture and Fisheries (ESCAF), 1240–1248.

[6] Maulana, MT, Sandra, R., Wardani, A., Utami, TU, Marlina, L., & Tambunan, TS (2025). System information Brida Medan City web- based digital library. Journal Information Polgan, 14(1), 1309–1315. https://doi.org/10.33395/jmp.v14i1.15041

[7] Muhammad, A., Amin, A., Yusti, E., Saputra, R., Hafiz, F. Al, & Rifai, B. (2020). System information Web- based e-trash application for waste bank. Reputation : Journal Engineering Device Soft, 1(2), 74–81. https://doi.org/10.31294/reputasi.v1i2.94

[8] Natasya, N., Juliandri, J., & Mariance, U. (2023). Design get up application system service administration population web- based (Study case : Village Kwala Begumit). INTECOMS: Journal of Information Technology and Computer Science, 6(2), 1258–1263. https://doi.org/10.31539/intecoms.v6i2.8393

[9] Nur'Alfienda, S., & Frendiana, V. (2024). Design of the " Clean Plus" waste bank administration website in the ProKlim Village of Depok City. National Seminar on Electrical Engineering, Systems Information and Informatics Engineering, 420–425. https://doi.org/10.31284/p.snestik.2024.5915

[10] Risaldy, HA, & Hardinata, RS (2023). Design get up system food menu information web-based (Study case : House Eat Sipirok). J-SISKO TECH (Journal Technology System Information and Systems TGD Computer), 6(2), 539–547. https://doi.org/10.53513/jsk.v6i2.8227

[11] Surorejo, S., Murtopo, AA, & Sigitta H., RC (2023). Application of the V-Model to waste bank applications web- based village Hunchback Subdistrict sacred Regency Tegal. Research and E- Journal Management Informatics Computers, 7(1), 693–703. https://doi.org/10.33395/remik.v7i1.12150

[12] Susanto, PZ, Surianto, DF, Manguling, ISW, Wulandari, S., & Akram, IF (2023). Design get up system information management transportation rubbish web based. Journal of Security, Computer, Information, Embedded, Network, and Intelligence Systems, 1(1), 24–30. https://doi.org/10.61220/scientist.v1i1.234