Volume 2, Issue 1, Oct 15 2024, Pages. XVI-XXXIII

IBN KHALDUN INTERNATIONAL CONFERENCE ON APPLIED AND SOCIAL SCIENCES (IICASS)

Universitas Ibn Khaldun Bogor

Technology Based Waste Bank Management to Support Green Business

Zulkarnaen Noor Syarif[a]*, Charmiyanti N. Kentjana Aju[b], Nadia Putri Purnama[c], Wira Sanjaya[d]*, Muhammad Qolbin Salim[e], Zea Sativa[f], Arsha Khoirunnisa[g]

[a,c,d,e,f,g] Ibn Khaldun University, Indonesia

[b]Politeknik Digital BOASH Indonesia

** Corresponding author e-mail: zulkarnaen.ns@uika-bogor.ac.id*

A R T I C L E I N F O

DOI: 10.32832/ uika.

Article history:
Received:
August, 26 2024
Accepted:
August, 28 2024
Available online:
Oct, 15 2024

Keywords:
Competency Training, Work Productivity, Nurse Loyalty, Inpatient Care

A B S T R A C T

This study examines the implementation and development of a web-based application for Bank Sampah Bersaudara, a community-based waste management initiative in Bantarjati Village, North Bogor District. Waste Banks are considered a green business activity due to their focus on environmental sustainability in their management practices. According to data from the Sistem Informasi Pengelolaan Sampah Nasional (SIPSN) released by KLHK in 2022, Indonesia still faces challenges in waste management, with 34.29% of the total 21.1 million tons of national waste not yet properly managed. Bank Sampah Bersaudara aims to increase community awareness and participation in waste management through the principles of 3R (Reduce, Reuse, Recycle) and the concept of a circular economy. The application developed in this study aims to facilitate the management and monitoring of waste savings by customers, providing real-time access to balance and deposit information. Testing results using the Black Box Method indicate that this application functions optimally and is expected to improve the efficiency, transparency, and accessibility of waste savings management at Bank Sampah Bersaudara, while also contributing to environmental conservation and the empowerment of the local community.

1. INTRODUCTION

The rise in population and the intensification of human activities have led to a substantial increase in the volume of waste produced. This surge in waste generation poses a significant challenge to environmental sustainability. Without effective management and disposal

strategies, the accumulation of waste can result in a wide range of environmental issues, including pollution of air, water, and soil, disruption of ecosystems, and increased greenhouse gas emissions. Consequently, the failure to properly manage waste not only threatens public health but also undermines efforts to achieve long-term environmental sustainability.

According to the Republic of Indonesia Law Number 18 of 2008), waste is defined as the residue of daily human activities and/or natural processes in solid form. This definition emphasizes that waste is not only a product of human activities but also includes the results of natural processes occurring in the environment. Effective waste management is crucial, considering that waste is an integral part of daily life and can impact environmental quality and public health. Based on data from the National Waste Management Information System (SIPSN) released by the Ministry of Environment and Forestry (KLHK) in 2022, the recorded national waste volume from 202 regencies/cities across Indonesia reached 21.1 million tons. Of this amount, approximately 65.71% or equivalent to 13.9 million tons of waste was effectively managed, indicating significant efforts in waste management. However, around 34.29% or 7.2 million tons of waste remains inadequately managed. This condition highlights a major challenge in the national waste management system, which requires serious attention and sustainable solutions to mitigate the negative impacts on the environment and society (KEMENKO PMK, 2023).

The synergy between the government and the community is a key element in efforts to manage waste effectively and sustainably. One form of collaboration that can be implemented is through the establishment and management of Waste Banks within the community. Waste Banks not only serve as collection points for waste but also function as institutions that encourage active community participation in sorting, managing, and recycling waste. With the presence of Waste Banks, the community is encouraged to be more environmentally conscious while also gaining economic benefits from waste management activities. Active community participation in the management of Waste Banks can also assist the government in achieving its target of reducing waste sent to Tempat Pembuangan Akhir (TPA). Through this synergy, waste that was previously poorly managed can be processed into valuable materials, reducing the volume of waste that pollutes the environment. Moreover, Waste Banks serve as an educational tool for the community to understand the importance of waste management at its source, thereby fostering a stronger environmental awareness culture within society.

According to the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 14 of 2021, Waste Banks are recognized as essential facilities in waste management based on the 3R principles (reduce, reuse, and recycle). Waste Banks not only serve as waste management centers but also act as effective educational tools in promoting behavioral change within communities regarding waste management. Additionally, Waste Banks are one of the pillars in implementing the Circular Economy concept, where waste is processed into resources that can be reused or recycled to minimize negative environmental impacts. These facilities are established and managed collaboratively by various stakeholders,

including the community, businesses, and/or local governments, highlighting the importance of synergy in achieving sustainable waste management.

The presence of Waste Banks has been proven to have a significant positive impact not only on the environment but also on social and economic aspects. Waste Banks directly contribute by creating new job opportunities and providing additional income for the community, ultimately enhancing their well-being (Usis, 2021). However, establishing, driving, and managing Waste Banks is not an easy task. This process requires a clear vision and strong commitment from its managers, especially from the initiators or founders who bear the significant responsibility of designing long-term strategies and inspiring active community participation. The success of a Waste Bank heavily depends on the ability of its managers to maintain motivation, continuously drive innovation in waste management systems, and build strong collaborations with various stakeholders(Addinsyah & Warmadewanthi, 2020). By doing so, Waste Banks can continue to grow and provide sustainable benefits for both the environment and the surrounding community.

Business activities that prioritize sustainability and environmental responsibility are often referred to as green business (Fathihani et al., 2024). The concept of green business encompasses various practices aimed at minimizing negative environmental impacts, such as reducing carbon emissions, improving the efficiency of natural resource use, and implementing recycling principles and the use of renewable energy. Companies that adopt green business practices are not solely focused on profitability but are also committed to maintaining ecological balance and supporting sustainable development (Wibowo, 2022). This term also refers to business efforts to integrate environmental values into all aspects of their operations, thereby contributing positively to environmental preservation and the overall quality of life in society.

Waste Banks are considered a green business activity due to their focus on environmental sustainability in their management practices. They play a crucial role in community-based waste management by encouraging public participation in sorting and processing household waste. The presence of Waste Banks in every village and urban area is essential to reduce the amount of waste sent to landfills and to support sustainable waste management practices. Ideally, Waste Banks should be established in every village and urban area (Hoesein, 2019). The presence of Waste Banks in each region is expected to foster synergy between the government, the community, and the private sector in developing an effective waste management system, while also promoting a circular economy at the local level.

Bank Sampah Bersaudara is located on Jl. Ciremei Ujung Bantarjati Kaum in the Bantarjati area of Bogor City. Bank Sampah Bersaudara is an initiative that has successfully integrated economic and environmental approaches by encouraging the community to deposit their waste, which can then be exchanged for economic value. However, with the advancement of technology, the manual management of Waste Banks faces various challenges, such as difficulties in recording and monitoring waste savings data, as well as limited access to information for customers. To address these issues, the implementation of web-based technology is proposed as a solution to enhance the operational efficiency of Waste Banks and to provide customers with the convenience of monitoring their savings in real time.

This article aims to explore the management of technology-based Waste Bank Bersaudara in supporting green business initiatives. The study focuses on the development of a computerized system for recording and monitoring waste savings, which facilitates rapid and accurate data accessibility. With this system in place, it is anticipated that Waste Bank Bersaudara will enhance service quality and encourage broader community participation in environmental conservation, in alignment with the principles of environmentally friendly sustainable business practices.

2. RESEARCH METHODS

In this study, the waterfall software development model was applied, known for its systematic and sequential approach. The waterfall model consists of five main stages that must be completed progressively. The Waterfall method involves a series of linear stages, where each stage must be completed before proceeding to the next (Pressman & Maxim, 2020).

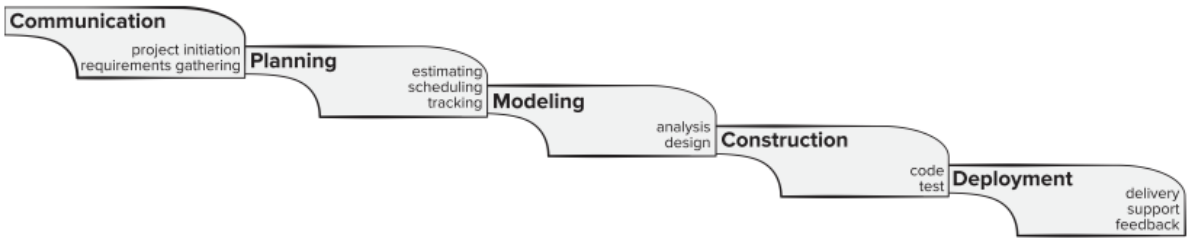

Figure 1: Waterfall Method

The first stage is communication, which begins with initiation involving an initial meeting between the development team and the management of Bank Sampah Bersaudara. The purpose of this meeting is to understand the vision, define objectives, and identify the expected outcomes. Following initiation, the process continues with requirements gathering, aimed at collecting and documenting all functional and non-functional requirements of the system to be developed. These requirements are obtained through interviews, discussions, and surveys with the development team and end users. The second stage is planning. After the software development requirements have been gathered, a detailed plan is developed, encompassing time estimates, resource allocation, and budgeting. A schedule is established to ensure that each task is completed on time. Continuous tracking is then conducted to monitor progress, identify obstacles, and ensure that the software development remains on track according to the plan. The third stage is modeling, where the gathered requirements are analyzed to define detailed system specifications, including business process mapping, data flow identification, and other technical specifications. Following the analysis, the design phase is conducted to develop the system architecture and technical design, encompassing workflow diagrams, data models, user interfaces, and other specifications that will guide the construction phase.

The fourth stage is construction, during which the designed system is developed through the coding process, where developers write program code according to the established design. The code is then tested to ensure compliance with the specified requirements and to confirm that it is free of bugs. This testing includes unit testing, integration testing, and comprehensive system testing. The final stage is deployment, which begins after the system has been successfully tested. During this stage, the system is delivered to the end users or implemented in a production

environment. At this point, the system is ready for actual operation. Ongoing support is provided to address any issues or bugs that may arise, and user feedback is collected to assess system performance and identify areas requiring further improvement or development.

3. RESULTS & DISCUSSION / HASIL & PEMBAHASAN

Bank Sampah Bersaudara was established on December 4, 2014, as a community-based initiative focused on the collection of non-hazardous waste. With the primary goal of raising public awareness about the importance of waste management and recycling, Bank Sampah Bersaudara encourages active participation from residents in maintaining environmental cleanliness. This concept emerged from the awareness of the importance of better and more responsible household waste management, as well as the desire to empower the community to utilize waste as a resource with economic value.

Bank Sampah Bersaudara is located at Jl. Ciremei Ujung Bantarjati Kaum RT.02 RW.10, Bantarjati Village, North Bogor District, Bogor City, West Java Province. This location was chosen to make it easier for the community to drop off their waste. Positioned in the middle of a densely populated neighborhood, the waste bank aims to be a gathering point and coordination center for local residents to work together on managing waste. With the facilities it has, Bank Sampah Bersaudara hopes to collect more waste and provide greater benefits to the surrounding community.

Currently, Bank Sampah Bersaudara has gained the trust of the local community to collect various types of waste, such as plastic, cans, bottles, iron, copper, aluminum, paper, cardboard, and electronics. The community members, who act as customers or clients, consist of 83 individuals who can deposit their waste with the waste bank management. This waste is then converted into monetary value. This process not only helps reduce the amount of waste that pollutes the environment but also provides financial benefits to those who deposit it. With this system, the community is more motivated to actively participate in collecting and sorting waste.

Every piece of waste deposited by the community is recorded and converted into savings in the form of rupiah. This savings system allows people to store the value of their collected waste as savings that they can use at any time. In the long run, this scheme is expected to encourage the community to develop thrifty and wise financial management habits.

As the manager of Bank Sampah Bersaudara, the process of depositing waste at the waste bank begins when customers bring recyclable non-organic waste to the waste bank's location. Upon arrival, the waste brought by the customer undergoes a selection and weighing process. The administrative staff checks the type of waste to ensure that it meets the recycling criteria accepted by the waste bank. Once selected, the waste is weighed, and the weight is recorded by the staff. This record serves as the basis for determining the economic value of the deposited waste. The waste is then further sorted and compiled according to its type to facilitate the recycling process based on established categories such as plastic, paper, or metal. After the selection and weighing process is completed, information about the weight and type of deposited waste is forwarded to the treasurer. The treasurer is responsible for recording this waste deposit transaction in the customer’s savings book and in the waste bank's general ledger for internal bookkeeping purposes. This record includes updating the customer’s balance based

on the economic value of the waste they deposited. The deposit process concludes with notifying the customer that their balance has been updated, allowing them to continue transactions in the future. With this structured workflow, Bank Sampah Bersaudara ensures that every waste deposit is well-documented and transparent. The waste deposit business process is illustrated in the document flow diagram shown in Figure 2.

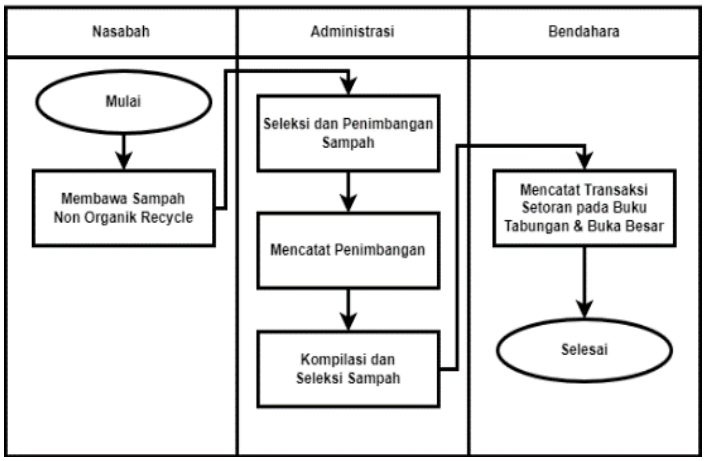

Figure 2: Waste Deposit Flow

Before a customer can deposit waste, they first need to register as a customer at Bank Sampah Bersaudara. The registration process involves several steps, including the prospective customer, the administrative staff, and the treasurer. The process begins when the prospective customer fills out a registration form for Bank Sampah Bersaudara. Once the form is completed, the administrative staff is responsible for validating the registration form. After the form is validated, the new customer's data is forwarded to the treasurer, who records the customer's information in the waste bank's general ledger. Once this record-keeping is completed, the registration process is considered finished. This workflow ensures that each customer goes through a structured and well-documented process, from filling out the form to being recordedin the general ledger. The customer registration business process for Bank Sampah Bersaudara is illustrated in the document flow diagram shown in Figure 3.

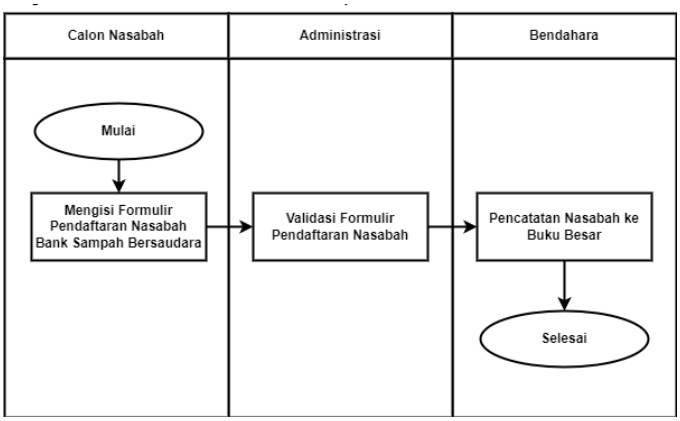

Figure 3: Customer Registration Flow

The next business process is the withdrawal of funds by customers at Bank Sampah Bersaudara. This process begins when the customer fills out a withdrawal form, which includes information about the amount they want to withdraw and their identity. Once the form is completed, the next step is approval by the administrative staff.

The administrative officer reviews and approves the withdrawal form to ensure that the withdrawal request matches the available balance in the customer's savings account. After the withdrawal form is approved, the administrative officer sends the information to the treasurer. The treasurer then records the withdrawal transaction in the customer's savings book and the general ledger, which is the waste bank's internal bookkeeping. Once the recording is complete, the treasurer disburses the funds according to the amount requested by the customer. The funds are then handed over to the customer. The withdrawal process concludes when the customer receives the funds, ensuring that the entire process is transparent and well-documented. With these clear steps, Bank Sampah Bersaudara ensures that every withdrawal transaction is carried out accurately. The customer withdrawal business process is illustrated in the document flow diagram shown in Figure 4.

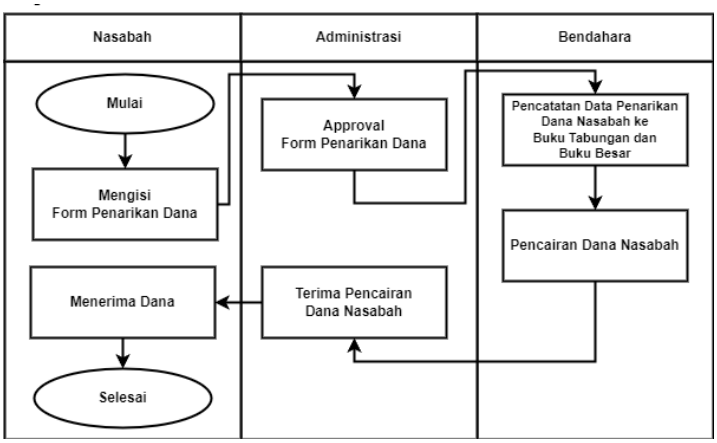

Figure 4: Customer Withdrawal Flow

The final business process for selling waste from Bank Sampah Bersaudara to a Partner begins with Bank Sampah Bersaudara contacting the partner to arrange for waste collection. The partner then weighs the waste according to its classification, and records the weight. The next step is for the partner to transfer the funds to the waste bank, which are then received by the bank's treasurer. Once the funds are received, the treasurer records the weight and the funds in the income report. The process concludes after all income is accurately recorded. This workflow is designed to ensure that every transaction between the waste bank and its partner is orderly and well-documented, from the initial contact stage to the final income recording. The waste selling process from Bank Sampah to the Partner is illustrated in Document Flow Figure 5 as follows.

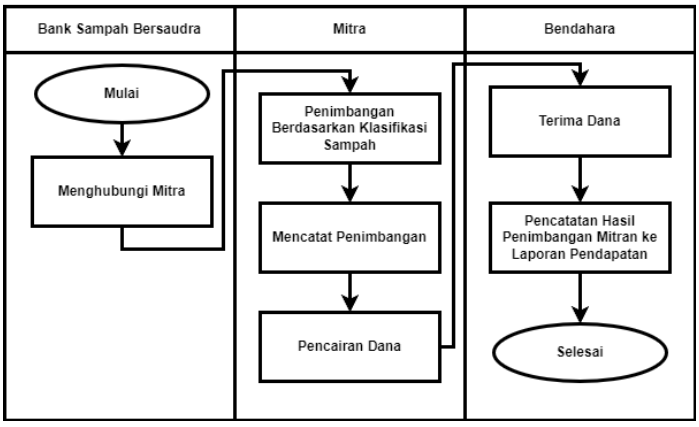

Figure 5: Waste selling process from Bank Sampah to the Partner Flow

Based on the analysis conducted, a computer-based system design is proposed to effectively address the issues faced by Bank Sampah Bersaudara. This system is designed to optimize the management of customer data, including the recording of waste deposits, withdrawal of customer balances, and the preparation of more efficient and accurate reports. By implementing this system, it is expected that the waste bank managers will be able to enhance operational efficiency, reduce the risk of data processing errors, and facilitate easier monitoring and reporting of the bank's activities overall. The system is also anticipated to contribute to improving the quality of service provided to customers and support a more systematic and structured waste management program.

A database is a collection of related data stored together on a medium, organized according to a specific schema or structure, and equipped with software that allows for data manipulation for specific purposes (Pamungkas, 2020). In other words, a database can be understood as a set of data arranged in the form of interconnected or standalone tables. Figure 6 shows the database design for recording waste savings at Bank Sampah Bersaudara.

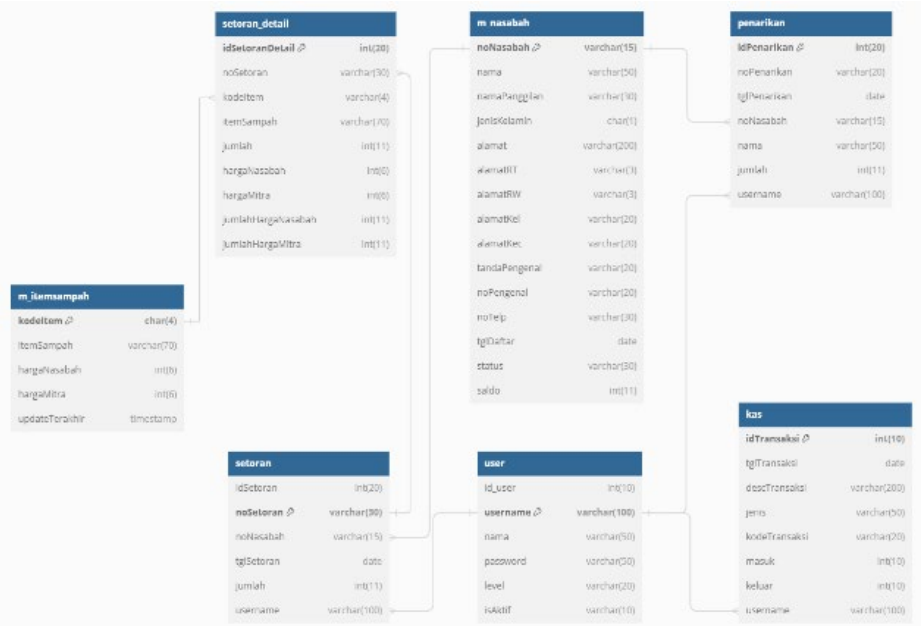

Figure 6: Database Design

The database design shown in Figure 6 is developed to support the waste savings recording system by integrating customer data management, deposit and withdrawal transactions, and cash management in a systematic and efficient way. The table m_nasabah serves as the main storage for detailed customer information, including identification number, name, address, gender, and account balance. Each waste deposit transaction made by a customer is recorded in the setoran table, which is linked to the setoran_detail table to capture specific details of each waste item deposited. The setoran_detail table also integrates with the m_itemsampah table, which lists the current prices of waste items applicable to customers and partners, as well as the last update time for these prices.

In addition, withdrawal transactions made by customers are recorded in the penarikan table, which includes information about the amount withdrawn, the date of the withdrawal, and the user who processed the transaction. All cash transactions, whether deposits or withdrawals, are systematically recorded in the kas table, which contains transaction codes, descriptions, and information about the user handling each transaction.

User management in the system is handled through the user table, which stores login data, access levels, and user activity status, ensuring that only authorized individuals can access and process data within the system. The structured relationships between tables in this design enable integrated tracking and management of every transaction and activity, supporting the effective and efficient operation of the waste bank.

A use case diagram is a model that represents the system's needs at a high conceptual level. It helps visualize use cases, the related actors, and their interactions (Unhelkar, 2018). Figure 7 shows the use case diagram for the Waste Savings Recording System at Bank Sampah Bersaudara.

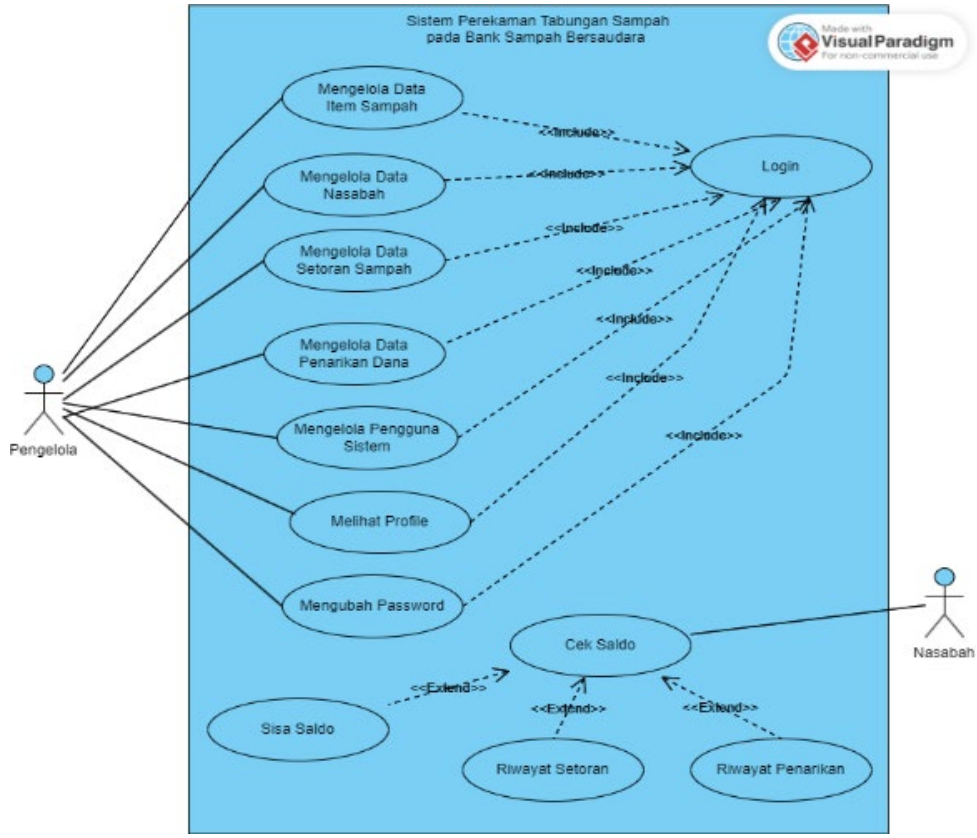

Figure 7: Use case Diagram The Waste Savings Recording System

The use case diagram presented in Figure 7 illustrates the workflow and main functions of the waste savings recording system at Bank Sampah Bersaudara, involving two main actors: the Administrator and the Customer. The Administrator has access to essential features, including management of waste item data, customer data, waste deposit data, withdrawal data, and system user management. Additionally, the Administrator can access their personal profile and change their password. All actions within the system start with an authentication process through login, which serves as the initial step to access all available features.

On the other hand, Customers are given access to check their savings balance through the Balance Check feature. This feature includes extensions that allow customers to view detailed information about their remaining balance, deposit history, and withdrawal history. The "include" relationship in the diagram indicates that the login process is a mandatory requirement for accessing all features in the system, while the "extend" relationship highlights additional features related to the main function, such as balance, deposit history, and withdrawal history, which are extensions of the Balance Check feature. Overall, this use case diagram provides a clear picture of the interaction between users and the system, supporting the efficient and structured management of the waste bank's operations.

The system construction, as designed, is developed through the coding process, where developers write program code according to the specified design. The technologies used in this construction phase include PHP as the programming language, MySQL as the database server, and Apache as the web server. Below is the interface view of the waste savings recording system at Bank Sampah Bersaudara.

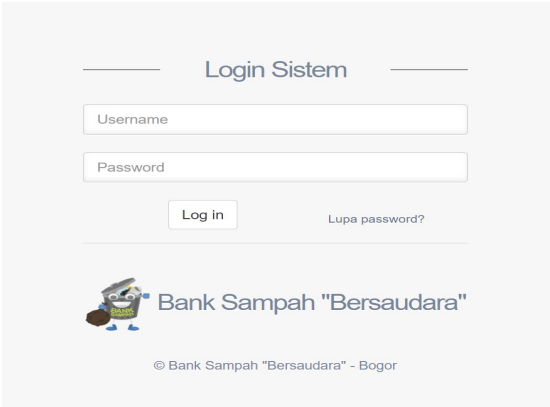

Figure 8: System Login Interface

Figure 8 shows the system login page, where users must log in using authentication information that matches their assigned access rights. Access rights are divided into admin and user categories. Users with admin rights have full authority to manage the system, including configuring settings, accessing more sensitive data, and making changes to system settings. On the other hand, users with user rights have limited access and can typically only use basic functions provided by the system without the ability to modify settings or sensitive data. This authentication process is crucial to ensure that each user can only access the parts of the system appropriate to their role, while maintaining data security and integrity.

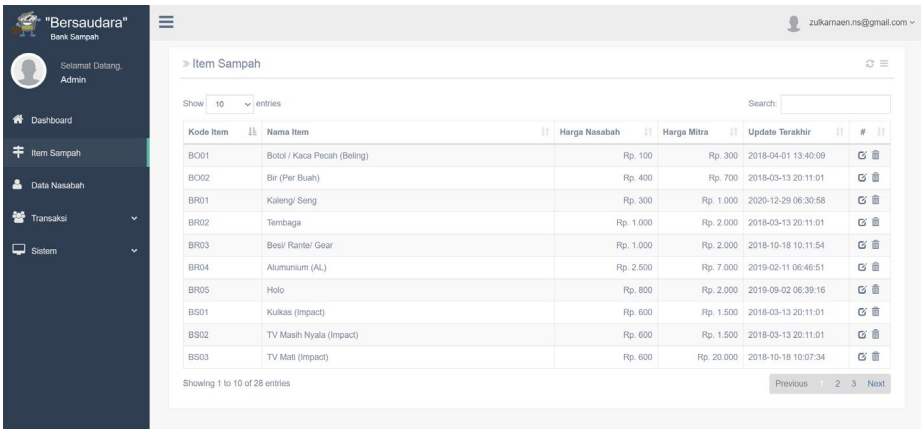

Figure 9: Manage Waste Items Interface

The waste item management page shown in Figure 9 includes three main operations: adding, editing, and deleting. The adding operation is used to input new data into the system, ensuring that information about waste items is up-to-date and includes all relevant items. Editing allows modification of existing information to correct or update data according to changes in conditions or additional information. Meanwhile, the deleting operation helps manage data by removing items that are no longer needed or relevant.

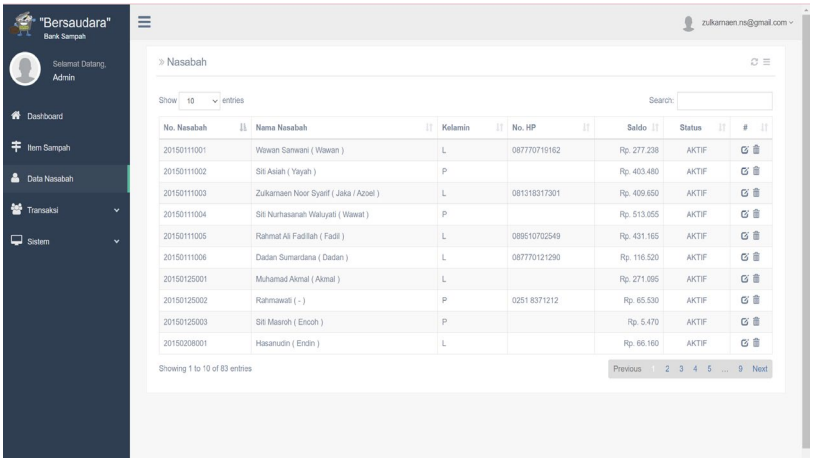

Figure 10: Customer Management Interface

In customer data management, as shown in Figure 10, there are three main operations: adding, editing, and deleting customer data. The adding process is aimed at inputting new customer information into the system, ensuring that all recorded data is current and includes relevant details. Editing allows for updating or correcting existing information to improve accuracy or adjust to changes in the customer's profile. Meanwhile, deleting data is intended to remove customer information that is no longer relevant or needed.

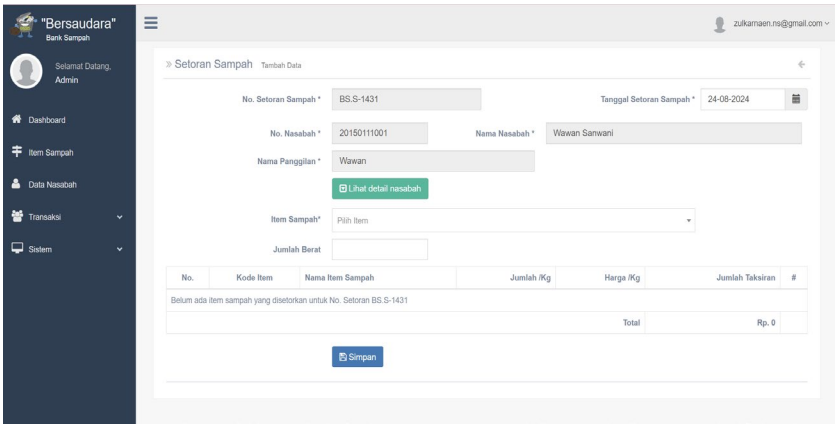

Figure 11: Waste Deposit Transaction Interface

Figure 11 shows the waste deposit transaction management page, which includes two main operations: adding and deleting transaction data. The adding process is intended to input new transaction records into the system, ensuring that each deposit is recorded accurately and completely. On the other hand, deleting transaction data is necessary for managing information that is no longer relevant or needs correction, such as in the case of transaction cancellations or fixing errors in waste deposit records.

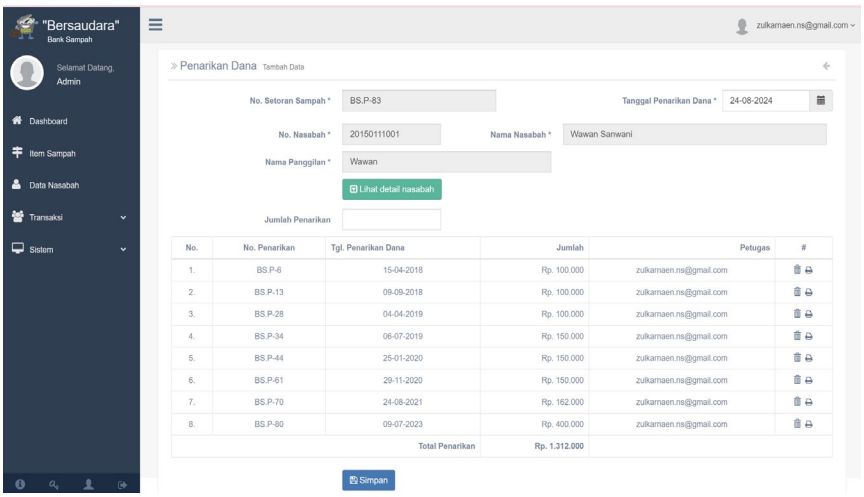

Figure 12: Fund Withdrawal Transaction Interface

Figure 12 shows the fund withdrawal transaction page, which includes two main operations: adding and deleting transaction data. The adding process is aimed at recording each withdrawal made by customers. On the other hand, deleting transaction data is necessary for managing information that is no longer relevant or needs correction, such as in cases of withdrawal cancellations or fixing errors in customer fund withdrawal records.

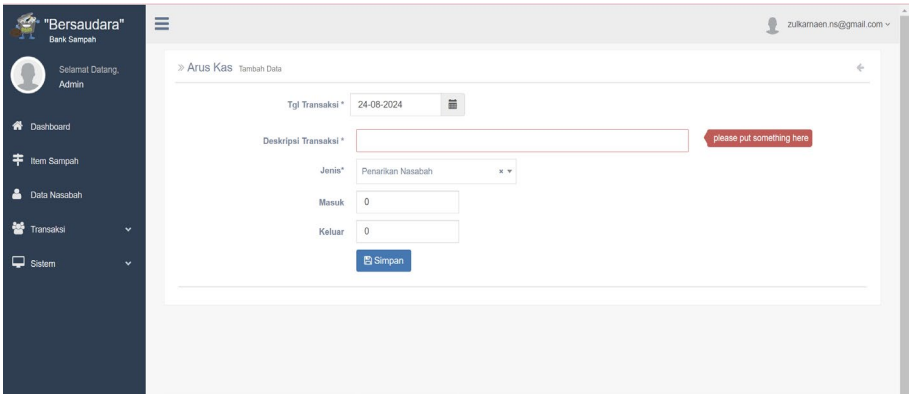

Figure 13: Cash Flow Interface

The cash flow transaction management page shown in Figure 13 includes three main operations: adding, editing, and deleting data. The adding process is intended to accurately record new transactions, ensuring that cash flow records are always up-to-date. Editing allows for correcting or updating existing information, ensuring that the data remains relevant and accurate. Meanwhile, deleting data is necessary for managing information that is no longer needed or requires correction, helping to maintain the accuracy and efficiency of the cash flow system.

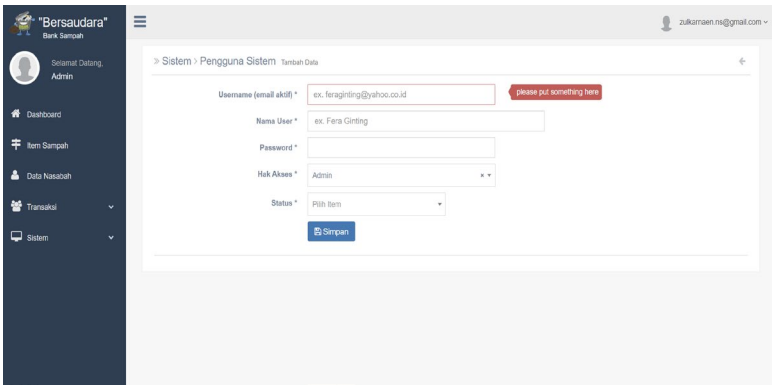

Figure 14: Application User Interface

In the system user data management page shown in Figure 14, there are three main operations: adding, editing, and deleting data. Adding user data aims to input new information into the system, ensuring that the user list is always up-to-date. Editing allows for updating or correcting existing information to maintain accuracy and relevance. Meanwhile, deleting data is necessary to manage information about users who are no longer active or needed, ensuring that the system remains valid.

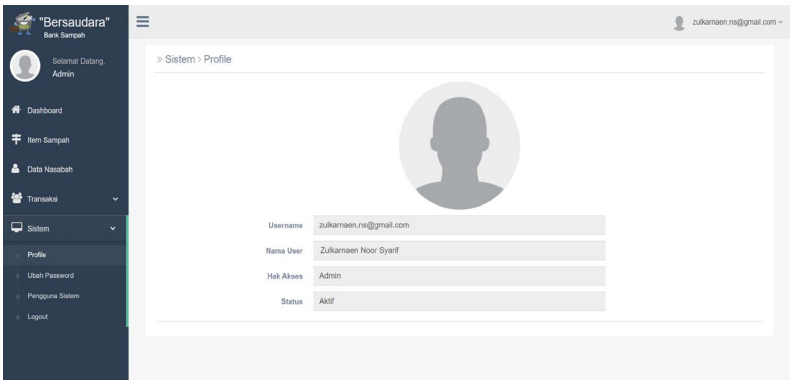

Figure 15: User Profile Interface

Figure 15 is the page for viewing user profiles, where it displays information and details about each application user.

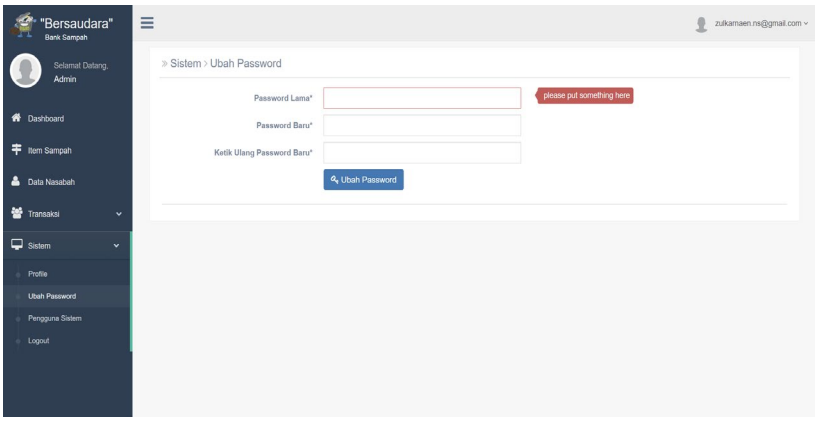

Figure 16: Change Password Interface

Figure 16 shows the page that allows users to update their password regularly, reducing the risk of unauthorized access. By changing the password, the system ensures better data protection and maintains the integrity of the user account.

The information system or application being developed must be designed to meet user needs and operate according to the specified requirements. To achieve this goal, testing is an essential step in the software development cycle, aimed at ensuring that every feature works properly and is free from errors. This testing is crucial to minimize potential disruptions to the user experience and to prevent negative consequences that could result from operational errors.

Black box testing is an important testing strategy in software development that focuses on finding situations where the program does not work according to its specifications (Wicaksono, 2021). Table 1 below shows the list of test cases for testing the Waste Savings Transaction Recording Application.

Table 1: Test Case Testing the Waste Savings Transaction Recording Application

No.	Test Description	Expected results	Test results	Information
1	Login with user access rights: admin and user	The system will display a Dashboard if the user is registered and displays data and menus according to user type.	The system displays a dashboard and displays menus according to user type	In accordance

No.	Test Description	Expected results	Test results	Information
2	Add, edit and delete trash item data	The system will process adding trash item data and editing trash data, when the trash item data entered in the column marked with an asterisk (*) is filled in, or deleting trash item data as selected.	The system successfully saves the added waste item data and updates the waste item data according to the latest data and deletes the desired waste item data.	In accordance
3	Add, edit and delete customer data	The system will process adding customer data and editing customer data, when the customer data entered in the column marked with an asterisk (*) is filled in, or delete customer data as selected.	The system successfully saved the added customer data and updated customer data according to the latest data and deleted the desired customer data.	In accordance
4	Add and delete waste deposit transaction data	The system will process adding waste deposit data, when the waste deposit data entered in the column marked with an asterisk (*) is filled in, or delete the waste deposit data as selected.	The system successfully saves the added waste deposit data and deletes the desired waste deposit data.	In accordance
5	Add and delete fund withdrawal transaction data	The system will process adding funds withdrawal data, when the funds withdrawal data entered in the column marked with an asterisk (*) is filled in, or delete the funds withdrawal data as selected.	The system successfully saves the added fund withdrawal data and deletes the desired fund withdrawal data.	In accordance
6	Add, edit and delete cash flow transaction data	The system will process adding cash flow data and editing cash flow data, when the cash flow data entered in the column marked with an asterisk (*) is filled in, or deleting cash flow data as selected.	The system successfully stores the added cash flow data and updates the cash flow data according to the latest data and deletes the desired cash flow data.	In accordance
7	Add, edit and delete system user data	The system will process adding user data and editing user data, when the user data entered in the column marked with an asterisk (*) is filled in, or delete user data as selected.	The system successfully saves the added user data and updates the user data according to the latest data and deletes the desired user data.	In accordance
8	View user profiles	The system will display the user profile.	The system successfully displays the user profile.	In accordance
9	Change user password	The system will process the user password update when the data entered in the column marked with an asterisk (*) is filled in.	The system successfully updated the password according to the latest data.	In accordance
10	Log out system	The system will display the login page when the user	The system successfully displays the login page	In accordance

No.	Test Description	Expected results	Test results	Information
		selects the "Yes Just Logout" button in the system exit confirmation dialog box	when the user selects the "Yes Just Logout" button in the system exit confirmation dialog box	

Table 1 above presents the results of testing a waste savings recording application using the blackbox testing method. The testing was conducted to evaluate various key features of the application, including user authentication, data management, and financial transactions. In the authentication testing, the system successfully displayed the dashboard and menu according to the user's access rights, both for admin and regular users. Furthermore, the data management features, such as the addition, editing, and deletion of waste item data and customer data, demonstrated optimal performance, with the system accurately processing and updating the data.

Additionally, testing of financial transactions, including waste deposit, fund withdrawal, and cash flow, revealed that the application effectively handles the addition, editing, and deletion of data with precision. The testing also covered user management features, where the system successfully processed the addition, editing, and deletion of user data according to the specified requirements. Additional features such as user profile display, password change, and logout were also tested, and all performed well according to the testing results.

Overall, the testing results indicate that the application functions as expected, providing reliable performance in data and transaction management, and efficiently supporting the operational processes of the waste bank. This testing confirms that the system meets the established functional requirements, ensuring that the application is ready for deployment in an operational environment.

4. CONCLUSION & SUGGESTION

A Waste Bank is a model of green business that can incorporate information technology into its management as a solution for recording waste savings. An information technology adaptation has been implemented in the form of the "Waste Savings Recording System Application" at Bank Sampah Bersaudara, which can be accessed via PC, laptop, mobile phone, or similar devices as a solution to the challenges faced by Waste Banks in recording waste savings transactions. This information system can enhance operational efficiency and provide better services to customers.

The use of this information system technology allows for greater transparency and accessibility of information, addressing the weaknesses of savings books, which are prone to damage, loss, and recording errors. With this system in place, Waste Bank managers no longer need to manually record waste prices, reducing the time required for transaction recording and minimizing the risk of errors.

Suggestions for Additional Feature Development: Identify and add features that can enhance the functionality of the waste bank information system. For example, integrate automatic image recognition technology to streamline waste management processes. Point and Reward System:

Implement a point collection mechanism for each transaction or waste management activity. Design a rewards program based on points, such as discounts at local merchants.

ACKNOWLEDGEMENT.

WE WISH TO EXTEND OUR HIGHEST APPRECIATION TO BANK SAMPAH BERSAUDARA FOR PROVIDING US WITH THE OPPORTUNITY TO CONDUCT THIS RESEARCH. WE ARE GRATEFUL FOR THE SUPPORT, ACCESS, AND INVALUABLE INFORMATION PROVIDED THROUGHOUT THE RESEARCH PROCESS. WE ALSO WISH TO THANK ALL THE STAFF OF BANK SAMPAH BERSAUDARA FOR DEDICATING THEIR TIME AND EFFORT TO ASSIST IN DATA COLLECTION AND FOR SHARING THEIR KNOWLEDGE AND EXPERIENCE.

FURTHERMORE, OUR DEEPEST GRATITUDE GOES TO UNIVERSITAS IBN KHALDUN BOGOR, PARTICULARLY THE PROGRAM STUDI SISTEM INFORMASI FAKULTAS TEKNIK DAN SAINS, FOR THE GUIDANCE AND ACADEMIC SUPPORT EXTENDED. THE FACULTY'S COMMITMENT TO FOSTERING A RIGOROUS ACADEMIC ENVIRONMENT AND THEIR PROFOUND INSIGHTS HAVE SIGNIFICANTLY ENHANCED THE QUALITY OF THIS RESEARCH. WE HOPE THAT THE FINDINGS OF THIS STUDY WILL MAKE A MEANINGFUL CONTRIBUTION TO IMPROVED AND SUSTAINABLE WASTE MANAGEMENT PRACTICES IN SUPPORT GREEN BUSINESS.

REFERENCES

Fathihani, F., Randyantini, V., & Puji Saputri, I. (2024). PENYULUHAN MODEL BISNIS HIJAU UMKM DALAM MENDORONG TRANSORMASI EKONOMI HIJAU. *Jurnal Pengabdian Kolaborasidan Inovasi IPTEKS*, *2*(2), 361–367. https://doi.org/https://doi.org/10.59407/jpki2.v2i2.573

Hoesein, A. (2019). *BANK SAMPAH Masalah & Solusi* (1st ed.). CV. SYAHADAH CREATIVE MEDIA (SCM).

KEMENKO PMK. (2023, August 5). *7,2 Juta Ton Sampah di Indonesia Belum Terkelola Dengan Baik*. Website KEMENKO PMK.

Pamungkas, C. A. (2020). *Pengantar Sistem Basis Data* (1st ed.). Indonusa Publisher.

Peraturan Menteri Lingkunan Hidup Dan Kehutanan Republik Indonesia Nomor 14 Tahun 2021 Tentang Pengelolaan Sampah Pada Bank Sampah, Pub. L. No. 14 (2021). www.peraturan.go.id

Pressman, R. S., & Maxim, B. R. (2020). *Software Engineering A Practitioner's Approach* (9th ed.). Mc Graw Hill. https://doi.org/10.1049/ic:20040411

Undang-Undang Republik Indonesia Nomor 18 Tahun 2008 Tentang Pengelolaan Sampah, Pub. L. No. 18 (2008).

Unhelkar, B. (2018). *Software Engineering with UML*. CRC Press.

Usis, T. (2021). *Sampah, Amanah, Rupiah*. Deputi Bidang Koordinasi Pengelolaan Lingkungan dan Kehutanan, Kementerian Koordinator Bidang Kemaritiman dan Investasi.

Wibowo, A. (2022). *Model Bisnis Ramah Lingkungan (Green Business)* (J. T. Santoso, Ed.). Yayasan Prima Agus Teknik & Universitas STEKOM.

Wicaksono, S. R. (2021). *BlackBox Testing Teori dan Studi Kasus* (S. R. Wicaksono, Ed.; 1st ed.). CV. Seribu Bintang.