International Journal of Electrical Engineering, Mathematics and Computer Science

E-ISSN: 3048-1945
P-ISSN: 3048-1910

Research Article

UI/UX Design of the Bangkitku Waste Bank Information System in Jambi City Using Design Thinking

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Abstract: Waste management is increasingly critical due to the rising waste generated by community activities driven by a consumptive lifestyle. A key solution to this issue is the implementation of waste bank programs, though community participation and operational efficiency remain challenges, as seen with the Bangkitku Waste Bank in Jambi City. This study focuses on designing the user interface for the Bangkitku Waste Bank Information System using the design thinking method and evaluating the usability of the prototype. The design process followed the five stages of design thinking: empathize, define, ideate, prototype, and test, with data collected through interviews and observations. The analysis involved tools such as empathy maps, user personas, sitemaps, and user flows, with prototypes created using Figma. Usability testing was conducted with 10 participants, including administrators and customers, resulting in high usability scores—98 for administrators and 97 for customers. The majority of participants found the system easy to use, as indicated by responses on the Single Ease Question (SEQ) survey. The prototype met key usability criteria, improving both operational efficiency and community engagement in waste bank management. The findings demonstrate the system's potential to foster sustainable environmental practices and enhance the effectiveness of waste bank management.

Keywords: Design Thinking; Information System; UI/UX Design; Usability; Waste Bank.

1. Introduction

Waste management has become a global issue that requires serious attention along with population growth, urbanization, and increasingly consumerist lifestyles. The increasing use of disposable products and a lack of awareness of waste sorting practices have contributed significantly to the ever-increasing volume of waste worldwide. According to a 2018 World Bank report, it is estimated that by 2050 the world will produce 3.4 billion tons of waste per year, a drastic increase from the current 2.01 billion tons. This demonstrates the urgency of developing innovative strategies in waste management, with a more sustainable and participatory approach. Governments, researchers, and communities need to collaborate to create solutions that not only address waste accumulation but also reduce its negative impacts on the environment and public health.In Indonesia, waste management remains a critical challenge. According to the National Waste Management Information System (SIPSN), national waste generation reached more than 38 million tons in 2023, reflecting an upward trend in comparison to previous years (KLHK, 2023). Jambi Province alone contributed approximately 291 thousand tons of waste in the same year. These figures underscore the urgency for local governments and community stakeholders to implement more effective waste reduction and management program.

One of the community-based initiatives that has been widely promoted in Indonesia is the establishment of waste banks. Waste banks function as micro-scale institutions where citizens can sort and deposit recyclable waste, which is then recorded as savings that can be exchanged for money or other benefits. In addition to reducing waste accumulation, waste banks empower communities economically and foster environmental awareness. However,

Received: 01 March, 2025
Revised: March, 15 2025
Accepted: March 29, 2025
Published: March 31, 2025
Curr. Ver.: March 31, 2025

despite these potential benefits, many waste banks face persistent challenges in ensuring operational efficiency and attracting sustained public participation.

The Bangkitku Waste Bank in Jambi City exemplifies these challenges. Based on interviews conducted with its management, the waste bank struggles with a limited number of active customers, totaling only 148 participants, which indicates low community engagement. Furthermore, the operational processes are still largely manual, requiring prospective customers to fill out forms in person, submit photocopies of identification, and pay registration fees on-site. Such procedures are not only time-consuming but also inconvenient for potential users, thereby discouraging broader participation.

Beyond registration, daily operations also suffer from inefficiencies. Transactions are recorded in physical logbooks, creating a high risk of data loss or damage. Savings withdrawals can only be processed directly at the waste bank office, which reduces customer convenience and limits flexibility. Moreover, the recycled products generated through waste bank activities receive minimal attention in the market due to weak marketing strategies. The fluctuating nature of recyclable waste prices further discourages customers from actively participating, as they struggle to determine the most profitable time to exchange their waste.

These challenges highlight the need for digital transformation in waste bank operations. Previous research has demonstrated the potential benefits of technology integration in community-based waste management. Putra and Bhakti (2024) showed that web-based information systems could improve efficiency by digitizing administrative processes, transaction recording, and reporting mechanisms. Such systems also enable better transparency, data accuracy, and ease of access for users, which in turn may foster greater trust and participation.

However, designing an information system that effectively meets the needs of waste bank stakeholders requires more than simply digitizing existing processes. A user-centered approach is necessary to ensure that the system is intuitive, accessible, and aligned with the expectations of both administrators and customers. Design Thinking has emerged as a relevant methodology for this purpose. As an iterative and flexible framework, Design Thinking emphasizes empathy with users and encourages solution development through the stages of empathize, define, ideate, prototype, and test (Juniantari et al., 2023)(Vinarsih et al., 2025).

Compared to other design approaches, such as User-Centered Design (UCD), Goal-Directed Design (GDD), and Activity-Centered Design (ACD), Design Thinking offers greater adaptability in addressing changing user requirements. Ilham et al. (2021) highlighted its strength in fostering innovation while maintaining practicality in system development. This adaptability is particularly relevant in waste bank contexts, where community needs, operational challenges, and market dynamics can evolve rapidly.

Building on these insights, this study focuses on the design of a user interface for the Bangkitku Waste Bank Information System in Jambi City using the Design Thinking methodology. The primary research objectives are to create a digital solution that improves operational efficiency, enhances user experience, and increases community participation. The study also aims to evaluate the usability of the developed prototype through Maze-based usability testing, ensuring that the proposed system is practical and effective in real-world application.

The contributions of this research are threefold: (1) the design of a prototype user interface tailored to the specific needs of waste bank stakeholders, (2) an evaluation of usability performance involving both administrators and customers, and (3) the provision of empirical evidence supporting the role of digital platforms in strengthening waste bank operations and community engagement. The remainder of this paper is organized as follows: Section 2 discusses related works in digital waste management and design methodologies, Section 3 elaborates on the research methodology, Section 4 presents results and analysis, and Section 5 concludes the study with implications and recommendations for future research.

2. Preliminaries or Related Work or Literature Review

Waste management has been widely studied as a global and national challenge due to its environmental and social implications. In Indonesia, one of the community-based solutions that has been promoted to reduce household waste is the establishment of waste banks. These institutions encourage citizens to sort recyclable waste and save it as deposits with economic

value. Previous studies (Nurhayati et al., 2022) emphasized that waste banks can empower communities both economically and environmentally. However, their effectiveness depends not only on community participation but also on efficient operational systems, which remain problematic in many regions.

Several researchers have attempted to address these operational inefficiencies through digitalization. Putra and Bhakti (2024), for example, demonstrated that a web-based information system could streamline administrative processes, improve transaction recording, and ensure more accurate reporting. Similarly, Rahmadani et al. (2023) found that mobile-based waste collection applications reduced human error in data entry and provided greater transparency. These findings indicate that digital platforms hold promise for improving waste bank efficiency. Yet, challenges remain, especially in designing systems that are intuitive and encourage long-term user engagement.

Community participation is another key factor in the success of waste banks. Kurniawan et al. (2021) noted that mobile applications for waste management could improve recycling behavior, but adoption rates were often hindered by complex interfaces and lack of user-centered design principles. This underscores the importance of integrating usability and user experience considerations into system development. Without a design that prioritizes user needs, digital systems risk underutilization despite their technical capabilities.

In the field of system design, various methodologies such as User-Centered Design (UCD), Goal-Directed Design (GDD), and Activity-Centered Design (ACD) have been applied to ensure systems meet user expectations. However, these approaches tend to be rigid when faced with rapidly changing requirements. To overcome this limitation, Design Thinking has emerged as a more flexible and iterative methodology. It emphasizes empathy with users and continuous refinement through its five stages: empathize, define, ideate, prototype, and test (Juniantari et al., 2023). Research by Ilham et al. (2021) highlighted that Design Thinking provides stronger adaptability in aligning systems with evolving user needs compared to UCD, GDD, or ACD.

Recent studies have applied Design Thinking in environmental and educational contexts, showing promising results. Santoso et al. (2022) reported that applying Design Thinking in developing a recycling application improved usability and increased adoption rates. Similarly, Widodo et al. (2023) found that Design Thinking enhanced user satisfaction in eco-friendly mobile applications. These examples indicate the methodology's relevance for designing systems where user engagement is essential. Nevertheless, few studies have applied this approach specifically to waste bank information systems in Indonesia, leaving a research gap in this domain.

Another gap lies in the limited use of usability evaluation methods in previous research. While prototypes have been developed, systematic usability testing involving real users is often neglected. Tools such as provide quantitative usability scores and task-based testing, are rarely utilized in waste bank studies. Incorporating such evaluations is important to validate system effectiveness and ensure alignment with user expectations. Moreover, most prior studies have focused primarily on operational efficiency, overlooking broader elements such as marketing recycled products and communicating dynamic waste prices, which are crucial for sustaining customer engagement(Yuda Mahendra et al., 2024).

Given these gaps, this research applies the Design Thinking methodology to design the user interface of the Bangkitku Waste Bank Information System in Jambi City. By combining iterative design with usability testing through Maze, this study aims to develop a digital solution that not only improves operational efficiency but also enhances usability and community participation. In doing so, the research contributes to bridging the gap between existing digital platforms and the practical needs of waste bank stakeholders, offering a more holistic and user-centered approach to community-based waste management.

3. Materials and Method

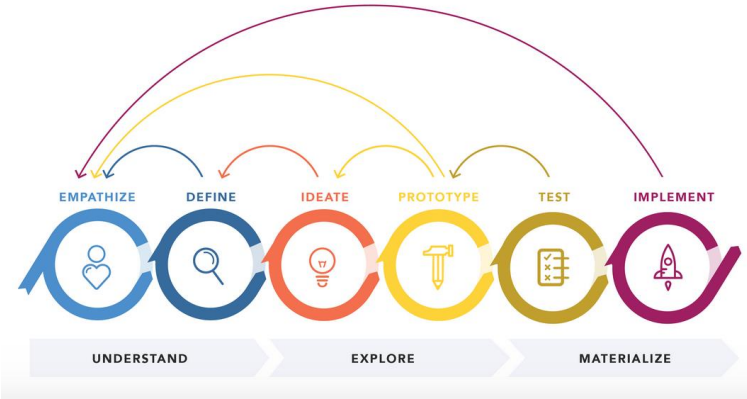

Figure 1. This is a figure. The Design Thinking Framework.

This study adopts the Design Thinking framework as the primary methodology for designing a web-based information system for *Bank Sampah Bangkitku* in Jambi City. Design Thinking was selected because it provides an innovative and user-centered approach that prioritizes user needs and experiences in the design process (Brown & Wyatt, 2010). The process consists of five stages: empathize, define, ideate, prototype, and test (Juniantari et al., 2023).

Empathize, The research began with a literature review to examine concepts related to information systems, waste banks, and the Design Thinking methodology. The empathize stage was conducted through semi-structured interviews and direct observations with two administrators and two customers of *Bank Sampah Bangkitku*. Informants were selected based on information sufficiency, meaning that data collection continued until the obtained data was considered representative of the research objectives (Heryana, 2018).

Define, In the define stage, qualitative data from interviews and observations were analyzed using empathy maps and user personas to articulate the main problems from the users' perspective (Pratama et al., 2024). This process enabled the identification of pain points and the formulation of clear design goals aligned with user needs.

Ideate, The ideate stage focused on generating multiple solutions to address the identified problems (Azisz & Kusuma, 2024). Brainstorming activities resulted in the creation of a sitemap and user flow, which structured the overall navigation and interactions within the system. These artifacts served as the foundation for subsequent interface development.

Prototype, In the prototype stage, proposed solutions were transformed into visual designs with three levels of fidelity: low, medium, and high. The prototypes were developed using Figma, allowing iterative refinement based on feedback. Each fidelity level progressively improved the detail, usability, and visual appeal of the system design.

Test, The test stage involved usability testing to evaluate the effectiveness of the developed prototypes. Usability testing is an evaluation method aimed at measuring the ease of use of a system interface through direct user interaction (Hardiansyah et al., 2019). The evaluation covered four key components: learnability, efficiency, errors, and satisfaction (Jakob Nielsen, 2012). Testing was conducted with 10 participants, consisting of five administrators and five customers of *Bank Sampah Bangkitku*.

Learnability, efficiency, and errors were assessed through predefined task scenarios, which provided participants with instructions for interacting with the system (Pandian et al., 2021). Meanwhile, the satisfaction component was measured using the Single Ease Question (SEQ), which asked: *"How do you rate the web-based information system of Bank Sampah Bangkitku?"* Responses were collected on a seven-point Likert scale ranging from 1 (*very difficult*) to 7 (*very easy*), with intermediate options including *difficult, somewhat difficult, neutral, somewhat easy, and easy*.

SEQ scores were categorized into two groups: scores between 1–4 indicated poor or unsatisfactory usability, while scores between 5–7 represented good or successful usability. This scale served as a benchmark for evaluating the overall usability level of the designed interface (Salam et al., 2024).

Implement, The final stage, implement, focused on transforming the validated prototype into a functional web-based system that can be directly utilized in the operational activities of

Bank Sampah Bangkitku. At this stage, the system was developed and deployed, ensuring that all core features—such as digital customer registration, transaction recording, savings management, and dynamic waste price updates—were fully operational. The implementation phase also ensured integration with administrative processes and provided training for end-users to maximize adoption and sustainability of the system.

4. Results and Discussion

This section presents the results of applying the Design Thinking model in system development. It also describes the data sources and provides an initial analysis of each Design Thinking stage, from Empathize to Prototype. The findings are presented in tables and figures, accompanied by a discussion that explains the relationship between the results, the research objectives, and hypotheses, as well as their impact on interface design and user experience.

Emphatize

The empathize stage aims to gain a deep understanding of users' needs, problems, and expectations. Through interviews, information was collected regarding operational activities, services, challenges faced, and stakeholders' perspectives on the implementation of a web-based solution. The collected data were then analyzed using an affinity diagram and classified into three main aspects, as shown in Figure 2.

Figure 2. This is a figure. User Affinity Diagram Results.

The analysis results using the affinity diagram revealed that both administrators and customers share similar needs, namely the implementation of digital record-keeping, ease of access to online services, and more practical information channels. The main issues identified include the continued use of physical media for recording and registration processes and suboptimal information delivery to users. Most respondents expressed the expectation that a web-based information system could support waste bank operations more efficiently, facilitate access, and enhance user engagement.

Define

The information obtained through interviews and observations was analyzed using an empathy map to understand what each user says, thinks, does, and feels. The results of the user empathy map analysis are presented in Figures 3 and 4.

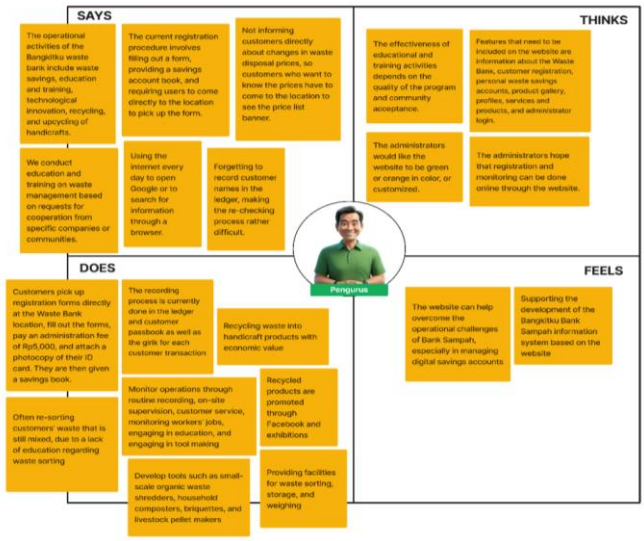

Figure 3. This is a figure. Administrator Empathy Map Results.

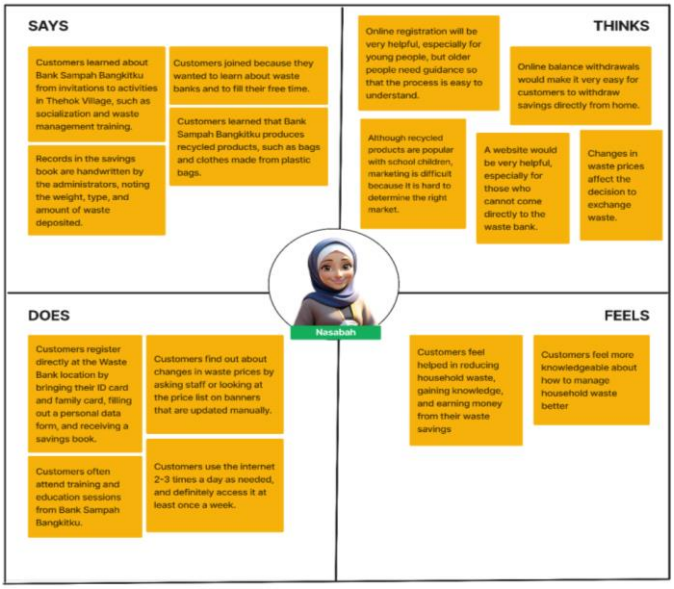

Figure 4. This is a figure. Customer Empathy Map Results.

Based on the results of the empathy map, user personas were developed to represent the characteristics of the users, reflecting their needs, goals, motivations, and frustrations. The user personas for each user are presented in the following figures.

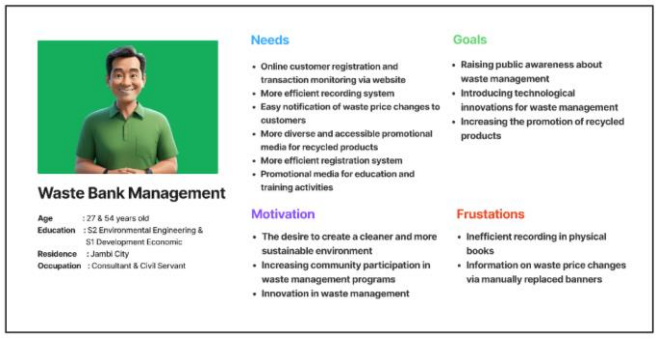

Figure 5. This is a figure. Manager User Persona Results.

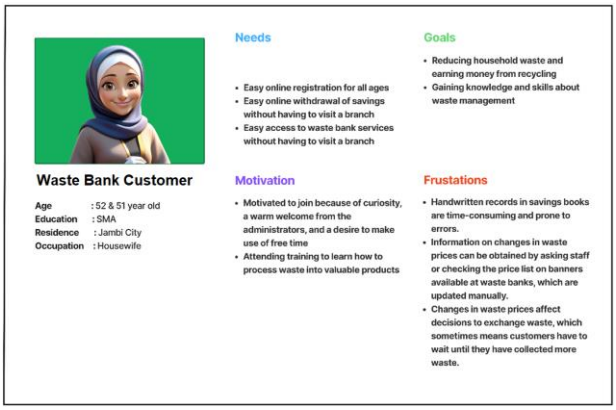

Figure 6. This is a figure. This is a figure. User Persona Results.

Ideate

Based on the analysis conducted in the Define stage, seven key features were identified to be developed as solutions addressing the needs of users, including both administrators and customers of Bank Sampah Bangkitku.

Table 1. This is a table. Key Features to Be Developed.

No	Problem	Feature
1	The registration and membership procedure for prospective customers at Bank Sampah Bangkitku is inefficient.	Online membership registration.
2	The process of recording waste savings deposits is still done using physical books.	Digital savings book recording system
3	The process of withdrawing waste savings is still conducted directly on-site.	Online waste savings withdrawal feature
4	Changes in waste prices are not communicated in real-time.	Up-to-date Waste Price feature.
5	Promotion of recycled products is still limited.	Product feature
6	Education and training are only conducted upon request.	Education and Training feature
7	Administrators face difficulties in monitoring operations and managing data efficiently.	Monitoring and Data Management Dashboard.

To clarify the structure and user interaction flow with the system, a site map was created to illustrate the hierarchy of pages within the website to be designed.

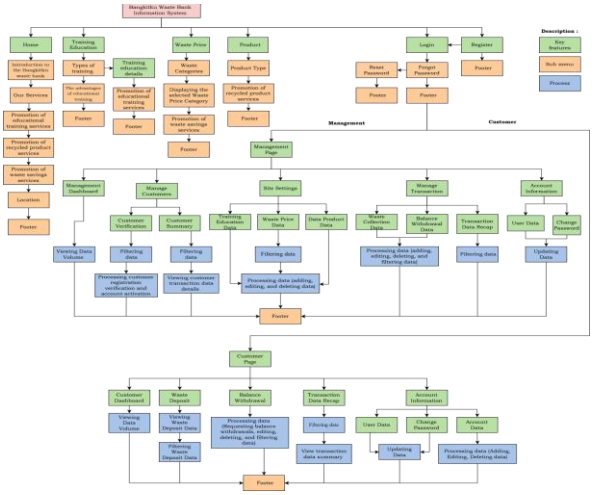

Figure 7. This is a figure. Bank Sampah Bangkitku Information System Site Map.

Referring to Figure 7, the system is divided into three types of interfaces: the main page, the administrator page, and the customer page.

a. Main Page: This includes the homepage, education and training, waste prices, products, as well as registration and login pages. All users can access these pages without logging into the system.
b. Administrator Page: This consists of the administrator dashboard, customer management (with submenus for customer verification and customer records), site settings (with submenus for education and training data, waste price data, and product data), transaction management (including submenus for waste deposit data, balance withdrawal data, and transaction summaries), and account information for managing administrator accounts. This page is only accessible to administrators who have logged in.
c. Customer Page: This includes the customer dashboard, waste deposits, balance withdrawals, transaction summaries, and account information for managing customer accounts. Access to this page is only available to customers who are logged into the system.

To visualize the stages of user interaction with the system, the user flow starts from accessing the main page. After successfully logging in, users are directed to the interface corresponding to their role. Users with the administrator role are directed to the administrator page, while users with the customer role are directed to the customer page.

Prototype

The prototype stage is a step to visualize the solutions generated during the Ideate stage in the form of system interface designs. In this study, the prototype was developed using Figma and divided into three levels of fidelity: low fidelity, medium fidelity, and high fidelity. At the low-fidelity stage, the design is presented as an initial sketch that illustrates the arrangement of basic elements, navigation, and content structure with a neutral color scheme. A visual example of this stage can be seen in Figure 8.

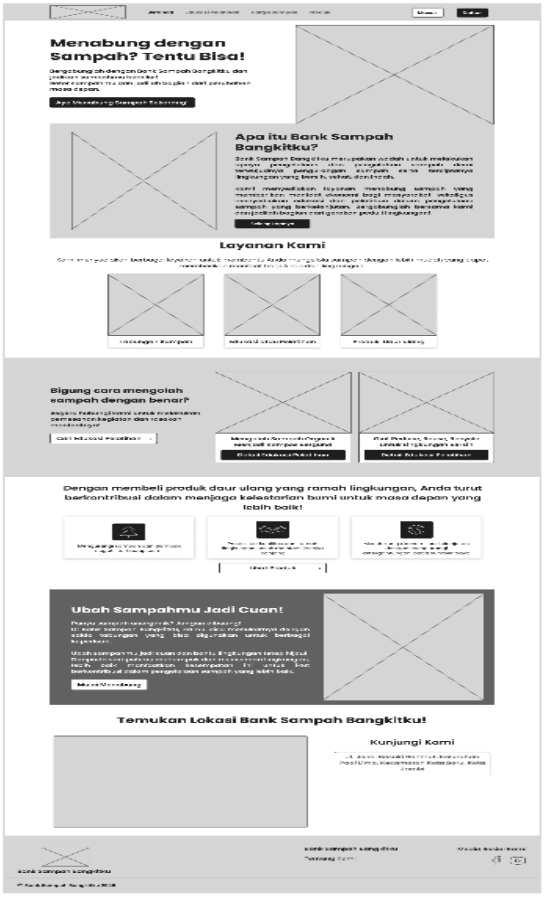

Figure 8. This is a figure. Medium-Fidelity Results.

Figure 9. This is a figure. High-Fidelity Results: Main Page.

In the final stage, the design was developed into a complete version incorporating comprehensive visual elements, such as colors, icons, images, and logos. This interface provides a more realistic representation of the system. Examples of the high-fidelity design results for the Bangkitku Waste Bank Information System are shown in Figures 9, 10, and 11.

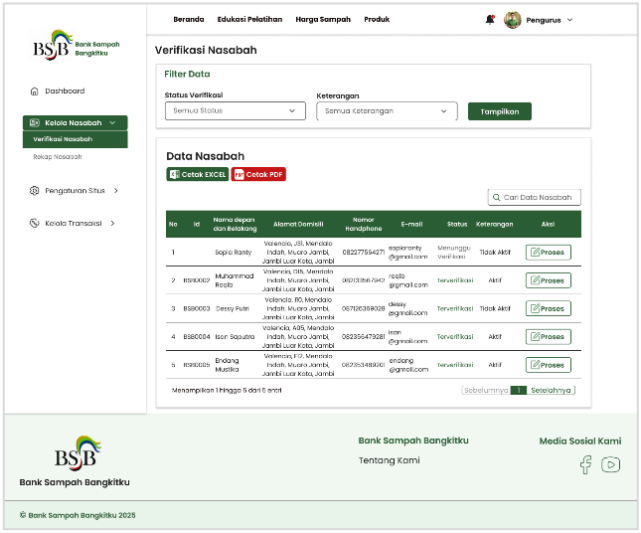

Figure 10. This is a figure. High-Fidelity Results: Administrator Page.

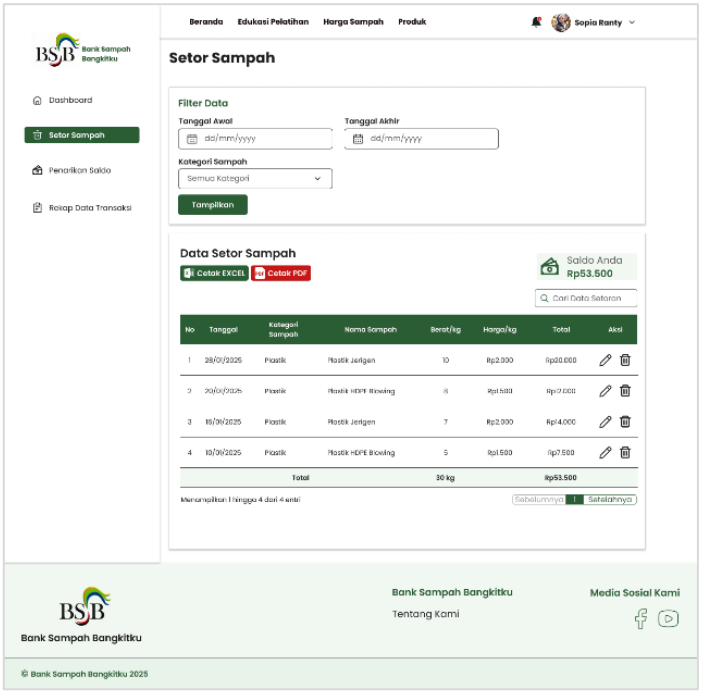

Figure 11. This is a figure. High-Fidelity Results: Customer Page

Test

The usability evaluation produced the following findings:

Administrator Evaluation

Administrators achieved a usability score of 98, which falls within the high category (range 80–100). This result demonstrates that the prototype is easy to comprehend, efficient in operation, and associated with a low frequency of interaction errors. The majority of misclicks were attributed to actions such as clicking outside designated task areas, inadvertent scrolling using the touchpad, inaccuracies in selecting dropdown options, and hastily confirming pop-ups without carefully reviewing the provided instructions.

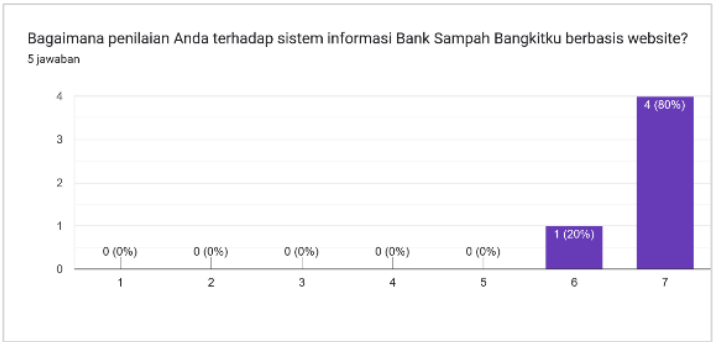

Figure 12. This is a figure. High-Fidelity Results: Customer Page.

The SEQ outcomes indicated that four administrators rated the system at scale 7 (Very Easy), while one administrator provided a rating of 6 (Easy), thereby reflecting a positive overall user experience.

Customer Evaluation

Customers recorded a usability score of 95, which is likewise categorized as high. Consistent with the administrator group, the prototype was considered easy to understand and operate, with minimal interaction errors. Common errors included clicking outside the guided areas, insufficient attention to task instructions, and unnecessary double-clicking on correctly selected interface elements.

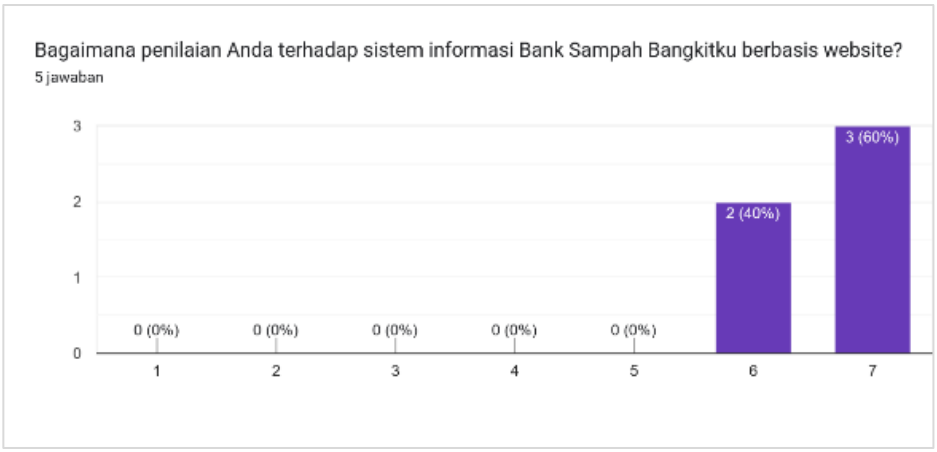

Figure 13. This is a figure. High-Fidelity Results: Customer Page

Within the SEQ assessment, three customers assigned a rating of 7 (Very Easy) and two customers rated the system at 6 (Easy), further reinforcing the system's favorable usability performance.

The combined findings from the Maze testing and SEQ survey confirm that the Bangkitku Waste Bank information system prototype attained usability scores within the high category, with SEQ ratings consistently concentrated at levels 6 and 7. These results provide strong evidence that the prototype effectively satisfies both functional requirements and user expectations. Accordingly, further design iterations are deemed unnecessary, as the system has already demonstrated compliance with established usability standards.

Implement

The implementation stage is the final step in the development of the Bangkitku Waste Bank Information System. At this stage, the validated prototype was transformed into a functional web-based system that can be used directly in daily operational activities. The process began with system development, where the user interface design from Figma was converted into a web application integrated with a database. Functional testing was also carried out to ensure that each feature worked according to user requirements.

Next, the main features were activated, including digital customer registration, transaction recording for deposits and withdrawals, savings management, and dynamic waste price updates. These features replaced the manual system, making the process more efficient, transparent, and user-friendly. The system was also integrated with administrative processes, allowing administrators to manage data, monitor activities, and generate reports in a more structured manner. To support user adoption, training sessions were provided for both administrators and customers to help them understand the system's workflow and minimize errors during usage.

The implementation phase concluded with an initial monitoring process, where real-time supervision was conducted to identify potential issues in practice. Based on this evaluation, the system was declared ready to be used as a digital solution to improve operational efficiency, strengthen customer participation, and support sustainable waste management practices.

5. Comparison

Several studies have previously explored the development of information systems for waste bank management in Indonesia. Most of these studies focus on the technical implementation of web or mobile-based applications, yet they often overlook the user-centered design process. For instance, Hidayat et al. (2021) proposed a mobile waste bank application that primarily emphasizes transaction recording and waste price updates. While the system improved operational efficiency, the lack of usability testing limited its ability to address user experience issues. Similarly, Fitriani and Nugroho (2022) developed a web-based

waste bank system that facilitated deposit and withdrawal processes, but their approach relied heavily on conventional software development life cycles (SDLC) without integrating iterative feedback from users. As a result, the solutions provided tended to be rigid and less adaptive to the evolving needs of both administrators and customers.

In contrast, the approach proposed in this study adopts the Design Thinking methodology with an additional implementation stage, ensuring that user needs are consistently prioritized throughout the design and development cycle. The empathize and define stages allowed researchers to deeply understand the pain points of both administrators and customers, while the ideation stage generated diverse alternative solutions. Unlike prior studies that directly transitioned from requirements gathering to system development, this research emphasized iterative prototyping (low-, medium-, and high-fidelity) and usability testing involving real users. This ensured that learnability, efficiency, error rates, and satisfaction were systematically evaluated before full-scale implementation.

Furthermore, the inclusion of an implementation phase strengthens the novelty of this work compared to state-of-the-art studies. While many waste bank systems stop at the prototype or pilot-testing stage, this research extended the process into actual deployment, enabling the system to be directly applied by Bank Sampah Bangkitku in Jambi City. This integration of user-centered design with practical implementation contributes a more sustainable and adaptive solution for waste management information systems. Therefore, the proposed method provides both theoretical and practical contributions that bridge the gap between conceptual design and real-world usability.

6. Conclusion

This research designed and developed a web-based information system for Bank Sampah Bangkitku in Jambi City using the Design Thinking approach with the addition of an implementation stage. The system was successfully developed through the stages of empathize, define, ideate, prototype, test, and implement, ensuring that user needs were prioritized throughout the process. Usability testing showed positive results in learnability, efficiency, error reduction, and user satisfaction, proving the system's effectiveness in supporting waste bank operations.

The findings highlight that combining Design Thinking with implementation can bridge the gap between conceptual design and real-world application. The system not only improves operational efficiency but also encourages community participation in sustainable waste management. However, the study is limited by the small number of participants and its application in only one waste bank. Future research should involve broader testing and expansion to other waste banks to strengthen generalizability.

Author Contributions: Conceptualization: Sopia Ranty and Noneng Marthiawati; Methodology: Reni Aryani; Software: Zainil Abidin; Validation: Sopia Ranty, Reni Aryani, and Winny Laura; Formal analysis: Reni Aryani; Investigation: Noneng Marthiawati; Resources: Zainil Abidin; Data curation: Winny Laura; Writing—original draft preparation: Noneng Marthiawati; Writing—review and editing: Reni Aryani and Winny Laura; **Visualization:** Zainil Abidin; Supervision: Sopia Ranty; Project administration: Winny Laura.

Funding: This research received no external funding.

Data Availability Statement: The data supporting the findings of this study are not publicly available due to privacy and ethical restrictions but can be obtained from the corresponding author upon reasonable request.

Acknowledgments: The authors would like to express their sincere gratitude to the management and staff of Bank Sampah Bangkitku in Jambi City for their valuable cooperation and willingness to participate in this research. Special thanks are also extended to Universitas Muhammadiyah Jambi for providing administrative and technical support that enabled the completion of this study. The authors acknowledge the use of AI-assisted tools, including OpenAI's ChatGPT, which were utilized to support language refinement and manuscript structuring. All content, analysis, and conclusions remain the responsibility of the authors

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

Azisz, A. M., & Kusuma, W. A. (2024). Perancangan user interface & user experience aplikasi TipsnTrip menggunakan metode design thinking. *Jurnal Infortech*, 5(2), 225-232. https://doi.org/10.31294/infortech.v5i2.20915

Brown, T., & Wyatt, J. (2010). Design thinking for social innovation. *Stanford Social Innovation Review*. https://doi.org/10.1596/1020-797X_12_1_29

Glowdy, A. G., Fauzi, R., Alam, N., & Kom, S. (2020). Perbaikan tampilan user interface untuk meningkatkan user experience pada aplikasi Nganggur.id menggunakan metode user-centered design. *E-Proceeding of Engineering*, 7(2), 7617-7624. https://openlibrarypublications.telkomuniversity.ac.id/index.php/engineering/article/view/12863

Hardiansyah, L., Iskandar, K., & Harliana. (2019). Perancangan user experience website profil dengan metode The Five Planes (Studi kasus: BP3K Kecamatan Mundu). *Jurnal Ilmiah Intech: Information Technology Journal of UMUS*, 1(01), 11-21. https://doi.org/10.46772/intech.v1i01.34

Heryana, A. (2018). Informan dan pemilihan informan dalam penelitian kualitatif. *ResearchGate*. https://www.researchgate.net/publication/329351816

Ilham, H., Wijayanto, B., & Rahayu, S. P. (2021). Analysis and design of user interface/user experience with the design thinking method in the academic information system of Jenderal Soedirman University. *Jurnal Teknik Informatika (Jutif)*, 2(1), 17-26. https://doi.org/10.20884/1.jutif.2021.2.1.30

Jakob Nielsen. (2012). Usability 101: Introduction to usability. *Nielsen Norman Group*. https://www.nngroup.com/articles/usability-101-introduction-to-usability/

Juniantari, M., Ulfa, S., & Praherdhiono, H. (2023). Design thinking approach in the development of Cirgeo's World media. *Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI)*, 12(1), 42-55. https://doi.org/10.23887/janapati.v12i1.55203

Marbun, R. R., Al Mufied, F., & Fauzi, R. (2022). Perancangan user interface/user experience (UI/UX) website HelpMeong untuk shelter menggunakan metode goal-directed design. *Jipi. Jurnal. Ilmiah. Penelitian. Dan. Pembelajaran. Informatika.*, 7(4), 1096-1109. https://doi.org/10.29100/jipi.v7i4.3190

Pandian, D. G., Rokhmawati, R. I., & Az-Zahra, H. M. (2021). Evaluasi usability pada website Mejakita menggunakan metode usability testing. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 5(10), 4517-4525. http://j-ptiik.ub.ac.id

Pratama, I. P. A. A., Paramitha, A. A. I. I., & Satwika, I. P. (2024). Penerapan metode design thinking dalam implementasi user interface berbasis website studi kasus JRO Sandat Property. *JTKSI: Jurnal Teknologi Komputer Dan Sistem Informasi*, 7(1), 73-86. https://doi.org/10.56327/jtksi.v7i1.1635

Putra, A. D. E., & Bhakti, H. D. (2024). Implementasi website bank sampah pada Kelurahan Pekelingan. *Switch: Jurnal Sains Dan Teknologi Informasi*, 2(4), 12-22. https://doi.org/10.62951/switch.v2i4.177

Salam, M. I., Setiawan, A., & Sukmasetya, P. (2024). Perancangan UI/UX pada sistem perpustakaan dengan pendekatan design thinking. *Journal of Information System Research (JOSH)*, 5(2), 676-685. https://doi.org/10.47065/josh.v5i2.4654

Vinarsih, O., Suryati, P., Raya, J., & Jl, J. (2025). Perancangan UI/UX aplikasi daur ulang sampah menggunakan metode design thinking. *Jurnal Informatika Dan Rekayasa Elektronik*, 8(1), 96-102. https://doi.org/10.36595/JIRE.V8I1.1522

Yuda Mahendra, N., Nulhakim, L., Irawan, A., Prasetya Kristiadi, D., & Studi Sistem, P. (2024). Penerapan sistem informasi pengelolaan bank sampah berbasis web pada STMIK Kuwera. *Jurnal Sistem Informasi Dan Teknologi (SINTEK)*, 4(2), 36-41. https://doi.org/10.56995/SINTEK.V4I2.73

World Bank. (2018). *A global snapshot of solid waste management to 2050*. World Bank. https://openknowledge.worldbank.org/entities/publication/d3f9d45e-115f-559b-b14f-28552410e90a?utm_source=chatgpt.com