Designing the UI/UX of Care Trash Website Using a Design Thinking Approach

Sherafim Glory Mei Stephany[1], Muhammad Akbar Raafi Rahmatulloh[2], Ryan Maulana Ardiyanto[3], Naila Muthia Sahira[4], Sugiarto[5*]

[1,2,3,4,5] Digital Business, Pembangunan of Nasional University Veteran Jawa Timur, Surabaya, Indonesia.

*Email: sugiarto.if@upnjatim.ac.id

Abstract. Care Trash is a web-based application that supports waste bank operations through features designed for members, drivers, and administrators. The application was developed using a Design Thinking approach, aiming to deeply understand user needs to create an intuitive and efficient user experience (UI/UX). In this study, the Design Thinking approach was applied through five stages: Empathize, Define, Ideate, Prototype, and Test. These stages enabled the design team to focus on key user issues and develop solutions tailored to their needs.

This study evaluated the effectiveness of the Design Thinking approach in designing Care Trash through a questionnaire distributed to 100 respondents, including members, drivers. Validation results indicate that 85% of respondents found the interface easy to use, and 80% felt that the available features met their needs. These findings suggest that the Design Thinking approach plays a significant role in enhancing user experience, particularly in terms of accessibility and feature relevance.

Keywords: Care Trash, Design Effectiveness, Design Thinking, UI/UX, Waste Bank.

Introduction

In recent years, environmental awareness has surged worldwide, motivating both individuals and organizations to adopt more sustainable practices. Waste management plays a pivotal role in achieving these goals, and waste banks have emerged as a key solution for encouraging recycling and responsible waste disposal within communities. Waste banks operate by allowing users, known as members, to deposit recyclable waste in exchange for points, credits, or other incentives, which can be redeemed or used for community improvement initiatives. Solutions featuring visually appealing and user-friendly interface designs (Koswara & Alifin, 2024). However, the success of such a program relies heavily on the usability and accessibility of its platform. In particular, the member page of a waste bank application, such as Care Trash, becomes a critical touchpoint, as it enables users to track their waste contributions, view account balances, manage personal information, and engage with additional services.

Care Trash is a web-based application designed to streamline waste bank operations and provide a seamless experience for users involved in the waste management cycle (Suratno & Shafira, 2022), including members, drivers, and administrators. However, the member page plays a unique role as it directly interacts with end-users, whose satisfaction and engagement are crucial for the program's success (Darmawan et al., n.d.). Given the diverse user base, the platform's design needs to prioritize intuitiveness and functionality, particularly on the member page. This study uses the Design Thinking approach to guide the development of the member page, aiming to create an interface that addresses user needs through a user-centered, empathy-driven methodology (Nasution & Nusa, 2021).

Design Thinking is a creative problem-solving approach consisting of five stages: Empathize, Define, Ideate, Prototype, and Test. This methodology emphasizes understanding the user's perspective and creating solutions that address their specific challenges. By applying Design Thinking to the development of the member page on the Care Trash platform, the design team can identify key pain points for members, such as difficulty tracking their contributions, understanding waste sorting guidelines, and accessing account-related information. These insights inform the development of features that directly address user needs, thereby

enhancing the overall user experience and encouraging continued engagement with the waste bank program (Malik & Frimadani, 2023). To validate the effectiveness of the Design Thinking approach in creating a user-centered member page, a structured questionnaire was distributed to 100 respondents, including both current and potential users of the Care Trash application. These participants provided feedback on the usability, accessibility, and relevance of features on the member page. Initial findings indicate that users benefit from a clear, streamlined interface that simplifies the process of logging contributions, viewing balances, and understanding how their actions contribute to larger environmental goals. This feedback highlights the importance of incorporating user insights from the earliest stages of design and serves as a foundation for further iterative improvements.

Ultimately, this study seeks to illustrate how the Design Thinking approach, when applied to the member page of a waste bank application, can create a more engaging and effective user experience. By focusing on user needs at each design stage, this approach ensures that the Care Trash platform aligns with users' environmental goals and encourages their active participation in sustainable practices (Damayanti et al., 2024). The findings underscore the value of Design Thinking in developing digital platforms that not only function effectively but also foster long-term user engagement and commitment to environmental sustainability.

Methods

This study employs a mixed-methods research approach, integrating qualitative and quantitative methods to design and evaluate the UI/UX of the Care Trash website, specifically focusing on the member page to enhance user interaction and satisfaction. The research follows the Design Thinking framework, which consists of five stages: Empathize, Define, Ideate, Prototype, and Test (Dewi et al., 2022). By combining qualitative insights from user interviews with quantitative survey data, this approach aims to ensure that the design is both user-centered and effectively meets users' functional needs.

1. Qualitative Phase: User Interviews and Observational Study

   Empathize and Define Stages: In the initial stages of the Design Thinking process, qualitative data is gathered through user interviews and observational studies involving 15 potential users, including members, drivers, and administrators. This phase aims to understand user pain points, preferences, and expectations related to the member page.

   Data Collection and Analysis: Semi-structured interviews focus on understanding user motivations, navigation challenges, and feature expectations. Observation of users' interactions with a preliminary prototype provides additional insights into real-time usability issues and workflows. Data is analyzed using thematic analysis to identify recurring themes and needs that inform the Define stage.

2. Quantitative Phase: Survey and Usability Testing

   Prototype and Test Stages: Based on the insights from the qualitative phase, the design team creates an initial prototype of the member page, focusing on identified user needs, including navigation simplicity, information accessibility, and feature relevance.

   Survey Questionnaire: A structured questionnaire, distributed to 100 respondents (members, drivers, and administrators), measures user satisfaction with key aspects of the interface such as ease of use, visual appeal, and feature usefulness. Respondents rate each element using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

   Usability Testing (System Usability Scale - SUS): Additionally, usability testing is conducted with a subset of 30 users who interact with the prototype. After completing specific tasks, users fill out the SUS to evaluate the interface's effectiveness, efficiency, and overall user satisfaction. SUS scores provide a quantitative metric to assess the usability of the member page.

3. Data Analysis and Validation

   Qualitative Analysis: Thematic analysis from the initial interviews guides feature prioritization and helps refine the prototype by addressing prominent user needs. Key themes, such as ease of tracking contributions and access to account details, are emphasized in the design.

   Quantitative Analysis: Survey and SUS data are analyzed using descriptive statistics to identify trends in user satisfaction and usability. Mean scores and standard deviations reveal the overall satisfaction level with the prototype, while correlation analysis assesses the relationship between specific design elements (e.g., navigation clarity, visual appeal) and user satisfaction.

Triangulation: By combining qualitative insights with quantitative feedback, this mixed-methods approach triangulates findings to validate the effectiveness of the Design Thinking approach in enhancing the UI/UX of the Care Trash member page.

During the Empathize phase, qualitative techniques such as interviews and observations were utilized to engage with stakeholders, including members, drivers, and administrators of waste banks (Koswara & Alifin, 2024). The goal of this phase was to identify their challenges, preferences, and expectations for a digital platform. The Define phase focused on analyzing and synthesizing the information collected during the empathize stage to formulate a well-defined problem statement (Syaeful Akbar et al., 2023). Personas and user journey maps were created to illustrate common user scenarios and the difficulties they encounter. In the Ideate phase, creative ideas were generated through brainstorming sessions and collaborative workshops. Initial wireframes and design concepts were developed as part of this process (Raffi Fadli et al., 2020).

The Prototype phase involved building a functional prototype of the Care Trash website. Key features such as member registration, driver scheduling, and administrative tools were incorporated, with iterative improvements based on user feedback. Lastly, the Test phase included usability testing with 100 respondents from various user groups (Misrina et al., 2022). A questionnaire was distributed to measure the interface's usability and the relevance of its features. The outcomes of this phase offered quantitative data that complemented the qualitative findings from earlier stages (Eka et al., 2023).

This comprehensive methodological approach ensured that the design of the Care Trash website was user-centric, effective, and aligned with the operational requirements of waste bank systems.

Result and Discussion
Result
1. Empathize Stage
Interviews and observations conducted with 100 stakeholders (75 members, 15 drivers, and 10 administrators) revealed common pain points. Members expressed difficulties in scheduling waste pickups and tracking their contributions to the waste bank. Drivers highlighted inefficiencies in locating pickup points and scheduling conflicts. Administrators faced challenges in managing member data and coordinating operations effectively.

2. Define Stage
Insights gathered in the empathize phase were synthesized into a clear problem statement: "Waste bank operations are hindered by fragmented communication and inefficient task management for members, drivers, and administrators." Personas representing each user group and their respective journey maps highlighted areas requiring intervention, such as simplified scheduling and real-time communication.

3. Ideate Stage
Brainstorming sessions generated innovative ideas, including an automated scheduling feature, integrated maps for drivers, and a dashboard for administrators to monitor operations. Wireframes were developed to visualize these solutions, ensuring alignment with user needs identified earlier.

4. Prototype Stage
The functional prototype of the Care Trash website incorporated:
a. Member Portal: User registration, scheduling pickups, and tracking contribution points.
b. Driver Portal: Real-time navigation to pickup locations and optimized route suggestions.
c. Administrator Dashboard: Tools for member management, driver coordination, and performance analytics.

5. Test Stage
The usability testing phase involved 100 respondents (40 members, 30 drivers, and 30 administrators). The evaluation yielded the following results:
a. Ease of Use: 85% of respondents found the interface intuitive and straightforward.
b. Relevance of Features: 80% of respondents indicated that the features met their operational needs.
c. Overall Satisfaction: 82% rated the overall user experience as "good" or "excellent."
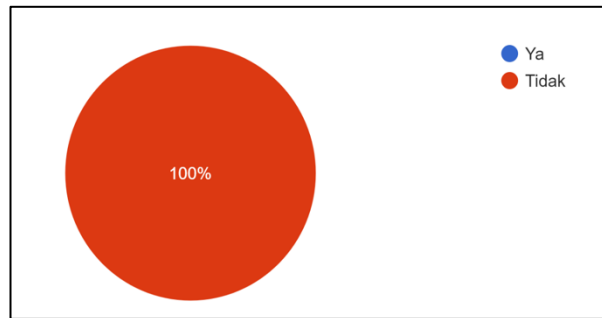
Figure 1. Respondent results of the application of Design Thinking to the development of UI UX in the waste bank system

A significant portion of respondents expressed clear expectations regarding the functionalities and usability of the waste bank system:

a. Ease of Use: 100% of respondents emphasized the importance of an intuitive interface that minimizes learning curves for first-time users. Members specifically requested a simplified registration process and a clear scheduling system for waste pickup.

b. Efficiency in Operations: 87% of drivers and administrators highlighted the need for streamlined coordination features, such as real-time navigation for drivers and task tracking for administrators.

c. Comprehensive Information: 76% of members expressed a desire for detailed reporting features, such as tracking contribution points and environmental impact statistics, which would enhance user engagement and awareness.

From the results of the questionnaire distribution, a prototype model for the UI/UX of the Waste Bank System was developed, as shown in the figure below :

Figure 2. User Interface Login Area

The Login Area of the User Interface is designed to provide a seamless and intuitive entry point for users of the Care Trash system. This interface includes the following key features:

User-Friendly Layout: The design incorporates a clean and minimalistic layout, ensuring ease of navigation for first-time and returning users.

Input Fields: Clearly labeled fields for entering user credentials, such as username or email and password, are positioned prominently to facilitate quick access.

Call-to-Action Buttons: A visually distinct "Login" button is provided, accompanied by additional links for "Forgot Password" recovery and "Sign Up" for new users.

Responsive Design: The interface is optimized for use on various devices, ensuring accessibility on desktops, tablets, and smartphones.

Security Features: Visual cues, such as a secure padlock icon, are included to reassure users of the system's commitment to data protection and secure login processes.

This design prioritizes simplicity, functionality, and a user-focused experience to encourage engagement and satisfaction.

Conclusion

This study demonstrates the effectiveness of applying the Design Thinking approach in designing the UI/UX of the Care Trash waste bank system. By systematically implementing the five stages of Design Thinking—Empathize, Define, Ideate, Prototype, and Test—the development process successfully addressed the diverse needs of stakeholders, including members, drivers, and administrators.

The results highlighted that 85% of respondents found the system interface easy to use, and 80% agreed that the features provided met their operational requirements. These findings confirm that the user-centered approach adopted in this study significantly enhanced the accessibility, usability, and functionality of the Care Trash system.

The insights gained from this research underscore the importance of iterative design processes and user engagement in developing digital solutions for community-focused operations like waste banks. Future work could expand on this foundation by incorporating advanced features, such as AI-powered analytics and real-time tracking, to further enhance the system's effectiveness and user satisfaction.

Ultimately, the study contributes to the growing body of knowledge on using Design Thinking for creating impactful and efficient digital solutions tailored to user needs.

The main conclusions of the study may be presented in a short conclusions section, which may stand alone or form a subsection of a discussion or results and discussion section

References (APA style, 7th Ed.)

Damayanti, W. R., Kuncoro, A. P., Subarkah, P., & Saputro, R. E. (2024). DESIGNING UI/UX OF DOCTOR'S CONSULTATION APPLICATION USING DESIGN THINKING METHOD. *JURTEKSI (Jurnal Teknologi Dan Sistem Informasi)*, *10*(2), 307–314. https://doi.org/10.33330/jurteksi.v10i2.3053

Darmawan, I., Saiful Anwar, M., Rahmatulloh, A., & Sulastri, H. (n.d.). *INTERNATIONAL JOURNAL ON INFORMATICS VISUALIZATION journal homepage : www.joiv.org/index.php/joiv INTERNATIONAL JOURNAL ON INFORMATICS VISUALIZATION Design Thinking Approach for User Interface Design and User Experience on Campus Academic Information Systems*. www.joiv.org/index.php/joiv

Dewi, E. Z., Fransisca, M., Handayani, R. I., & Cahyanti, F. L. D. (2022). Analysis and Design of UI/UX Mobile Applications for Marketing of UMKM Products Using Design Thinking Method. *Sinkron*, *7*(4), 2329–2339. https://doi.org/10.33395/sinkron.v7i4.11505

Eka, O., Regina, C., Rasha, A., Agnes, S., Nur, S., & Nuraisyah, A. (2023). *Waste Bank in Indonesia: Problem and Opportunities* (pp. 284–290). https://doi.org/10.2991/978-94-6463-144-9_27

Koswara, R., & Alifin, F. I. (2024). A User-oriented UI/UX Application Design Using The Integration of Quality Function Deployment (QFD) and Design Thinking Methods. *MOTIVECTION : Journal of Mechanical, Electrical and Industrial Engineering*, *6*(1), 85–100. https://doi.org/10.46574/motivection.v6i1.308

Malik, R. A., & Frimadani, M. R. (2023). Lean UX: Applied PSSUQ to Evaluate Less-ON UI/UX Analysis and Design. *International Journal of Advances in Data and Information Systems*, *4*(1), 73–85. https://doi.org/10.25008/ijadis.v4i1.1263

Misrina, N., Supratman, E., Ariandi, M., & Ulfa, M. (2022). UI Design of Medical Check-Up Information System at Pratama Clinic Based on Design Thinking Method. *Journal of Information Systems and Informatics*, *4*(4). http://journal-isi.org/index.php/isi

Nasution, W. S. L., & Nusa, P. (2021). UI/UX Design Web-Based Learning Application Using Design Thinking Method. *ARRUS Journal of Engineering and Technology*, *1*(1), 18–27. https://doi.org/10.35877/jetech532

Raffi Fadli, M., Wibawanto Program Studi Seni Rupa, W. S., Seni Rupa, J., Bahasa dan Seni, F., & Negeri Semarang, U. (2020). *Arty: Journal of Visual Arts USER INTERFACE AND USER EXPERIENCE OF INDOSPORT MOBILE APPLICATIONS USING A USER CENTERED DESIGN APPROACH.* http://journal.unnes.ac.id/sju/index.php/arty

Suratno, B., & Shafira, J. (2022). Development of User Interface/User Experience using Design Thinking Approach for GMS Service Company. *Journal of Information Systems and Informatics*, *4*(2). http://journal-isi.org/index.php/isi

Syaeful Akbar, M., Prawira, T. Y., Setianama, M., Muhammadiyah, S., & Brebes, P. (2023). PENERAPAN METODE DESIGN THINKING PADA PERANCANGAN USER INTERFACE (UI) DAN USER EXPERIENCE (UX) APLIKASI MATA PELAJARAN KEMUHAMMADIYAHAN BERBASIS ANDROID DI MTs MUHAMMADIYAH BUMIAYU. *Jurnal Teknik Informatika Dan Sistem Informasi (JURTISI)*, *3*(2), 27–36.