Journal of Software Engineering, Information and Communication Technology (SEICT)

Journal homepage: https://ejournal.upi.edu/index.php/SEICT

Refuseapp: Waste Transportation Service Application

Jodi Setiawan, Salman Rachmawan, Andhika Primaditama, Falih Mufadol*

Department of Software Engineering, Universitas Pendidikan Indonesia, Indonesia

*Correspondence: E-mail: jodisetiawan@upi.edu

ABSTRACT

Garbage is still a big problem throughout the world, including Indonesia. This waste problem has not yet found the right solution to deal with the increase in waste that continues to grow from year to year. Included in these problems are waste problems, both household waste and industrial or company waste. There are still wastes that cannot be processed and managed properly. The purpose of this study is to find solutions to minimize the accumulation of waste or waste, especially in the sector of an agency. The solution offered in this research is the design of an application called Refuseapp. This application functions as a waste transportation service devoted to the agency sector. This waste transportation service is provided free of charge in the hope of reducing the pile of waste that exists in the agency. The institutions in question are companies and hospitals. The waste to be transported will later be distributed to a waste processing site or waste bank and also to a final disposal site (TPA) in the area. The result of this research is the design of the Refuseapp application in the form of an application mockup.

ARTICLE INFO

Article History:
Submitted/Received 15 Nov 2022
First Revised 20 Nov 2022
Accepted 25 Nov 2022
First Available online 28 Nov 2022
Publication Date 01 Dec 2022

Keyword:
Agencies,
Final disposal sites,
Services,
Final disposal sites.

1. INTRODUCTION

Waste continues to be a problem that has not been effectively solved on a global scale. In fact, the total amount of waste in the world reaches 3 billion tons, and only one-third of it is successfully recycled. The issue of waste management still lacks a proper solution to tackle the increasing waste generation each year (Gottinger, 1988). Plastic waste is the most prominent type of waste in Indonesia, primarily due to its continued use and demand by the population. Plastic waste poses a significant problem not only for terrestrial ecosystems but also for marine ecosystems.

The city of Bandung sends an average of 1,324 tons of waste per day to the Sarimukti Landfill. Besides the substantial financial burden on the local government to cover transportation and tipping fees, the large daily waste volume also has social and environmental impacts (Manila and Sarto, 2017). Dealing with waste is a collective responsibility that should involve not only the government but all elements of society. Various solutions have been implemented by the government and the community, such as the establishment of waste banks, exchange programs where waste is traded for useful items like money or groceries, waste collection services, and more (Morrissey and Browne, 2004). However, these solutions still have shortcomings, particularly in terms of consistency and equitable implementation across all regions. As a result, poorly managed waste accumulates in areas that lack proper waste management.

Several obstacles hinder the optimal waste processing. These obstacles include a shortage of transportation resources, such as insufficient vehicles and personnel, resulting in the inability to collect all waste (Ndoa and Kurniati, 2022). In fact, ten percent of the waste is not collected by the relevant authorities because it is scattered or dumped into rivers. Another constraint is the overload of the existing landfill site (TPA) without alternative sites available, causing long queues of waste trucks from the Bandung metropolitan area (Qadri et al., 2020).

Furthermore, the current advancements in technology should be utilized as supportive tools to address this waste problem (Rahmanto et al., 2020). Leveraging technology can be highly beneficial in waste management as it serves as a support system (Marali et al., 2018). One of the issues examined in this research is the accumulation of waste outside designated disposal areas. Factors contributing to this problem include a lack of available waste disposal sites, distant locations of waste disposal facilities that are difficult for the public to access, and the uneven distribution of waste transportation systems implemented by the relevant authorities in each region (Suryani et al., 2022).

Based on the aforementioned information, to support these challenges, a proposed design and concept of an application are suggested in this project. The application aims to assist institutions in transporting waste from its respective locations to disposal or treatment facilities without any cost (Pratama et al., 2018; Marsellah et al., 2022). The application will function similarly to ride-hailing apps but will specifically focus on waste transportation from relevant sites to designated waste disposal or processing facilities within the region.

2. METHOD

2.1. Waste or garbage

Waste is defined as material that lacks value or usefulness for its intended or primary purpose, either due to being damaged, defective in production, excessive, rejected, or discarded (Desiani et al., 2021). It refers to substances that are disposed of or discarded from human activities or natural processes and do not possess economic value (Khaer et al., 2020). Waste is something that is no longer useful and is discarded by its owner or original user. It represents an unused resource.

DOI: http://doi.org/10.17509/seict.v3i2.47090
p- ISSN 2774-1656 e- ISSN 2774-1699

Broadly speaking, waste or garbage can be categorized into two types: organic waste (such as kitchen waste, restaurant waste, vegetable scraps, etc.) and inorganic waste (such as paper, plastic, rubber, etc.) (Yanto, 2018). On the other hand, waste is categorized into three types: organic waste, inorganic waste, and hazardous waste (B3 waste, which refers to hazardous and toxic substances) (Taufiq, 2015).

2.2 Service

In general terms, services can be defined as voluntary actions undertaken by one party to assist or fulfill the requests or needs of another party (Skibniewski, 2015). It involves providing assistance or fulfilling the needs of others voluntarily. Services can also be understood as meeting or providing for the needs of others as the recipients of the service. Service, in a general sense, refers to providing whatever is required by others (Alfian and Phelia, 2018).

2.3 Garbage transportation

Transportation is a means or vehicle used to transport or pick up and deliver something to its destination (Dhika et al., 2016). On the other hand, waste transportation specifically refers to the transportation dedicated to carrying the existing waste from its collection point to the final disposal site (Abdallah et al., 2020).

2.4. Figma

Figma is a vector graphics editor and prototyping tool with online and offline functionality in a desktop application for Mac OS and Windows. Figma has also released Figma Mirror as a companion app for Android and iOS, allowing you to view Figma prototypes on mobile devices. Figma can be described as a UI and UX design application that can be used to create small websites, applications, or UI components that can be integrated into other projects, with a focus on real-time collaboration.

2.5. Prototype model

The research method used in designing the Refuseapp application is the prototype model. The prototype model is a software development process that is beneficial when the client cannot provide detailed information about their desired requirements (Clift et al., 2000). The stages of the prototype model consist of listening to the client or gathering the necessary information (Requirement Analysis), building or improving the application (Application Design), and testing the application (Testing) (Rahmanto et al., 2020; Utami et al., 2022).

3. RESULTS AND DISCUSSION

3.1. Prototype designing

The solution to address waste issues, particularly institutional or company waste, is the development of an application called Refuseapp, as shown in **Figure 1**. This application is designed for mobile devices and requires internet access to utilize its services. Before designing the application prototype, the system or workflow of the Refuseapp application is planned. The prototype of this application is created as a mockup using Figma software.

The workflow of the Refuseapp application starts with the user (referring to an institutional user operated by members responsible for cleanliness) gathering or preparing the waste for disposal. They then initiate the waste transportation process through the "Dispose Waste" feature, where they fill in several details such as waste specifics, location settings, and

DOI: http://doi.org/10.17509/seict.v3i2.47090
p- ISSN 2774-1656 e- ISSN 2774-1699

confirmation. The application will then check for available "Refusers" (waste collectors) to perform the waste collection. Once a Refuser is assigned, they will proceed to the location, and the relevant information will appear on the Refuseapp application page. After the waste has been collected, the user can confirm within the application that the waste transportation has been completed.

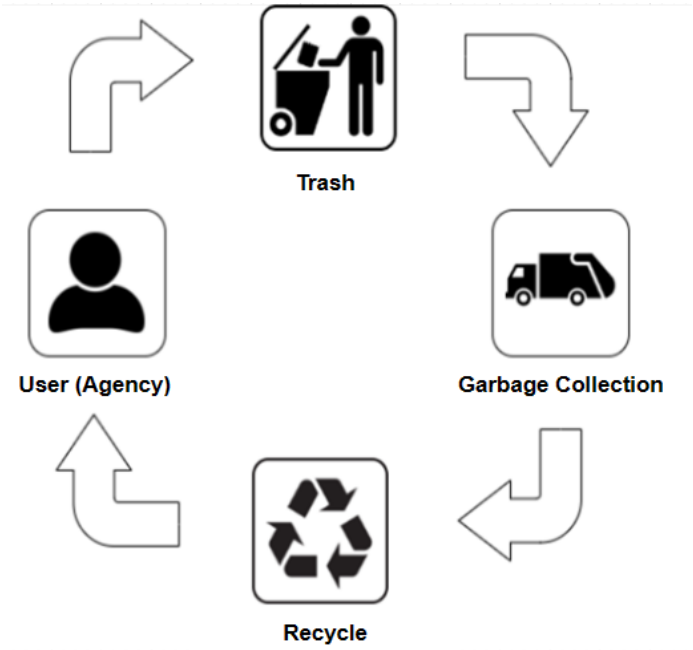

Figure 1. Prototype designing.

3.2. Interface Designing

a. Splashscreen

First page when opening Refuseapp application in **Figure 2**

Figure 2. Splashscreen design.

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b. Homepage

The homepage consists of several information and features in the Refuseapp application. These features include Dispose Waste, Achievements, History, and News that provides environmental information in **Figure 3.**

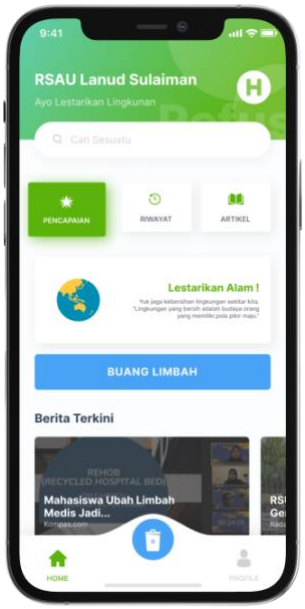

Figure 3. Homepage.

c. Login and Register Page

The page when creating an account or logging in with an existing account in **Figure 4.**

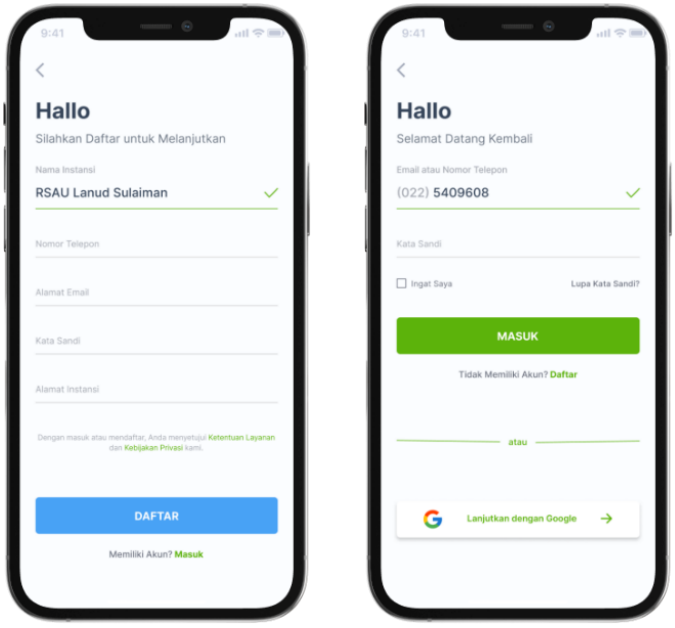

Figure 4. Login and register page.

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d. Waste Disposal Page

This page will appear when the user clicks on the "Dispose Waste" option on the homepage. After that, the user inputs relevant data about the waste to be disposed of, such as description, category/type, and form. Then, the user sets the waste collection schedule, quantity of waste, and can add photos and/or videos to show to the Refuser who will collect the waste in **Figure 5-6**.

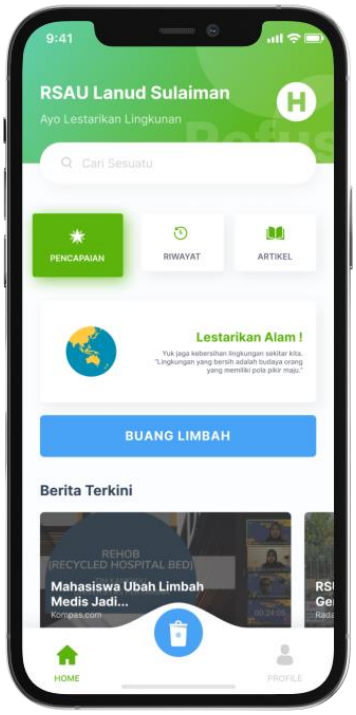

Figure 5. Default homepage.

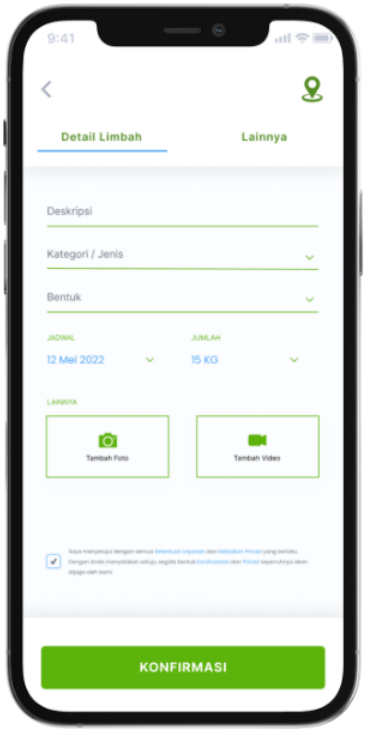

Figure 6. After click on the “Dispose Waste”.

DOI: http://doi.org/10.17509/seict.v3i2.47090
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e. Waste Disposal Page (2)

On this page, users set the location for waste collection by the Refuser in **Figure 7.**

Figure 7. Location for waste collection.

f. Waste Disposal Page (3)

After confirming both the location and the details of the waste to be disposed of, this page will appear as a notification that the next page will be displayed when the Refuser for waste collection becomes available in **Figure 8.**

Figure 8. Notification.

DOI: http://doi.org/10.17509/seict.v3i2.47090
p- ISSN 2774-1656 e- ISSN 2774-1699

g. Waste Disposal Page (4)

On this page, users set the location for waste collection by the Refuser in **Figure 9.**

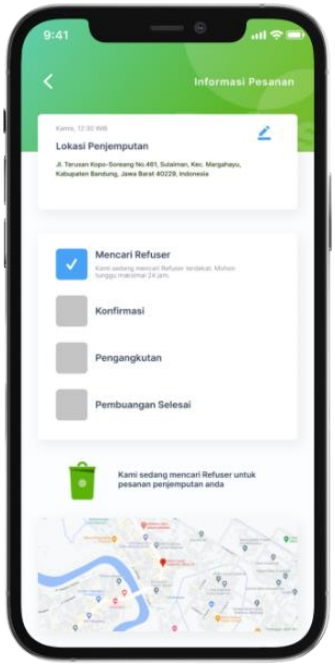

Figure 9. Set location by users.

4. CONCLUSION

This research has produced a mobile-based application system design called Refuseapp. The application is designed to facilitate and facilitate institutions or companies in disposing of their waste. The main feature of this application is the Waste Disposal feature. The advantages of this application include ease of use, guaranteed privacy and confidentiality, and free waste transportation. The waste will be transported to waste processing facilities suitable for its type or to the final disposal site (TPA) in the respective area.

However, a limitation of this research is that it only resulted in the design and mockup, so testing cannot be conducted to assess the effectiveness of the Refuseapp application. Further research and development are needed to proceed with the actual application development process, which will provide convenience to the relevant parties, especially in waste disposal issues. For future research, the design and mockup can be further developed into an actual application.

5. AUTHOR'S NOTE

The authors declare that there are no conflicts of interest associated with the publication of this article. The authors also ensure that this paper is free from plagiarism.

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DOI: http://doi.org/10.17509/seict.v3i2.47090
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DOI: http://doi.org/10.17509/seict.v3i2.47090
p- ISSN 2774-1656 e- ISSN 2774-1699