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The Improvement of The Web-Based Application "Sampahqu" to Enhance Data Management Efficiency at The Waste Bank

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ABSTRACT

SAMPAHQU as a waste collection company in Tangerang Selatan plays a crucial role in the circular economy. With the increasing number of customers and collaborating waste banks, the need for a waste deposit application that can be accessed by SampahQu, waste bank administrators, and customers has become evident. This application is intended to facilitate SampahQu in monitoring the volume and types of waste deposited, as well as the corresponding monetary transactions to be paid to customers or waste bank administrators. Additionally, customers and waste bank administrators can access information regarding the types and quantities of waste they have deposited, along with the earnings derived from these deposits. To address these requirements, a web-based waste deposit application has been developed, enabling access via mobile devices. Nonetheless, several issues have been identified during its implementation, such as the lack of a payment reporting feature to the waste bank and the absence of customer-specific reports grouped by waste bank. Consequently, this research focuses on the enhancement of the SampahQu application to improve its utility for waste banks and SampahQu customers.

Keywords **-** SampahQu, Waste Collection, Web-Based Application

INTRODUCTION

The development of the industrial sector with a linear economy approach may result in negative environmental impacts because it focuses solely on human activities, disregarding environmental aspects (Purwanti, 2021). As a solution, many countries, especially in the European Union, are encouraging the implementation of a circular economy system to support sustainable development. Circular economy is a system that emphasizes the optimal utilization of resources so that they are not wasted or lose value (Benton, Hazell, & Hill, 2014). In this system, resources are recovered and utilized productively for as long as possible. This concept differs from the linear economy, which only focuses on the process of raw material extraction, production, and waste disposal. To effectively implement a circular economy, active participation from all levels of society is required. One form of implementation at the household level is through the existence of waste banks (Purwanti, 2021).

Based on data from the Waste Bank Management Information System (SIMBA) of the Ministry of Environment and Forestry (KLHK, 2024), until 2024, there were 20,283 waste bank units serving 649,895 customers. The total waste collected reached 142,725 tons, with an economic value of 34.19 billion rupiah. Research by Saputra, Meidiana, and Sari (2023) showed that knowledge about waste problems, information related to the concept of 3R (Reduce, Reuse, Recycle), and education about 3R significantly influenced public interest in participating in waste bank activities. Similar research results by Ibrahim and Yanti (2021) also revealed that education related to waste recycling conducted at the "Harapan Baru Women Farmers Group" in West Sumatra succeeded in changing residents' behavior, such as stopping the practice of burning waste, processing organic waste into compost, and collecting inorganic waste to be deposited in the waste bank.

Since 2018, the Industrial Engineering Study Program UPH has collaborated with SAMPAHQU, a waste collection entity operating in the South Tangerang area. SAMPAHQU manages the collection of waste that has economic value from various waste banks in the region and beyond. The business was established by Posma Sorimuda in 2014, with an initial focus on compost production. However, since 2016, it has transitioned into a waste collection business (Sorimuda, 2020).

With the increasing number of customers and partnering waste banks, there is a need for a digital application to facilitate the waste deposit process. The application aims to assist SAMPAHQU partners in monitoring the type and amount of waste deposited and managing payments to customers and waste bank administrators. To address these needs, the Community Service (PkM) team from the Industrial Engineering Study Program at UPH has developed a web-based application (Rahayu, Simatupang, & Christiani, 2023), as illustrated in Figure 1.

Fig. 1. Transaction input display menu in the Sampahqu application

Based on the evaluation of the SampahQu application usage, several inputs from waste bank administrators and collectors were identified. Therefore, improvements were made to the Sampahqu application so that it could meet the needs of its users.

LITERATURE REVIEW

The Indonesian government has enacted legislation to regulate waste management, specifically Law of the Republic of Indonesia Number 18 of 2008 on Waste Management and Government Regulation Number 81 of 2012 on the Management of Household Waste and Similar Waste. These regulations advocate for a paradigm shift from waste disposal towards 3R (Reduce, Reuse, Recycle) (Al Zahra & Shohibuddin, 2025). Such a transition can be facilitated by establishing waste banks, which generate economic benefits while supporting environmental conservation (Effendi *et al.,* 2023). The implementation of waste banks aims to foster a cultural change among Indonesians regarding waste handling and to promote responsible waste management practices through waste sorting systems (Purwendah & Wahyono, 2022). An increasingly popular and innovative method in Indonesia is community-based solid waste management, through the establishment of waste banks (Budiyarto, Clarks & Ross, 2025). This system, rooted in community participation, serves as a middleman that allows residents to exchange their sorted waste for economic benefits (Al Zahra & Shohibuddin, 2025).

Based on several previous studies (Rachma *et al*., 2024, Destriana *et al*., 2021), it is known that waste banks often encounter difficulties in managing their customers' waste savings data. Destriana *et al.* (2021) developed an Android-based application for the Sharia Waste Bank at Kampung Kemuning, Binong Village, Tangerang, to help customers monitor their savings balances and transactions. Another waste bank application was developed by using NetBeans IDE 8.0 in South Sekeloa village, Bandung city (Effendi *et al.,* 2023) that enables the community to conduct waste processing activities more effectively, particularly in managing waste transaction data, thereby optimizing time efficiency. The waste bank information system can assist the officers of *Bank Sampah Mandiri* in Sumurjomblangbogo Village in managing customer data, waste data, deposit transactions, withdrawal transactions, sales transactions, and online waste savings books through a website-based platform (Muhardono, 2023). It also enables customers to monitor their waste savings balance at any time without having to visit the waste bank in person. Pamungkas, Susanti & Resmanah (2020) developed web-based application that can assist the administrator in the waste management process, including doing transactions with integrity, facilitating the search for waste data, and assisting in generating reports related to the processes that take place at the Teja Village Waste Bank. A web-based waste recording application developed for waste management in the Kayu Putih Subdistrict, East Jakarta has demonstrated improvements in the operational efficiency of waste banks, minimized errors in data recording, and fostered greater community involvement in waste sorting and recycling initiatives (Rachma *et al.*, 2024).

METHODOLOGY

The enhancement of the *SampahQu* application was undertaken through a systematic process that began with conducting a series of structured interviews with its users: SampahQu administrator, waste bank administrators and waste bank customers. These interviews were designed to elicit detailed information regarding user requirements, preferences, and the challenges encountered during the application’s utilization. The insights gained from this needs assessment served as a critical foundation for guiding the subsequent refinement of the application, particularly in terms of feature development and user interface design. By aligning the improvements with empirically identified user needs and constraints,

the application was optimized to ensure greater usability, functionality, and overall effectiveness in supporting waste management activities.

RESULTS AND DISCUSSION

Based on previous research activities, it is known that web-based waste bank applications can speed up and facilitate waste bank officers in conducting transactions, managing customer savings data accurately, and can be accessed at any time (Hendradi *et al.*, 2025, Lelyani *et al*., 2022). Therefore, the previously developed "SampahQu" application (Rahayu, Simatupang and Christiani, 2023) needs to be improved so that its use is more efficient and meets the needs of users: collectors, as well as customers and waste bank administrators.

Improvements to the sampahQu application include changing the domain from sampahqu.org to sampahqu.com. The display on the SampahQu home page features a description of SampahQu, including its vision and mission (see Fig. 1). Additional information regarding waste and the waste deposit schedule was also included in the improved "SampahQu" application (Fig.2). In the registration menu, there are two categories of users: users (customers) and waste banks (administrators). Users enter their name, photo, address, telephone, username and password. New users can use the application if the username has been activated by the waste bank management for the user category, and the admin for the waste bank category (can be seen in Fig. 3).

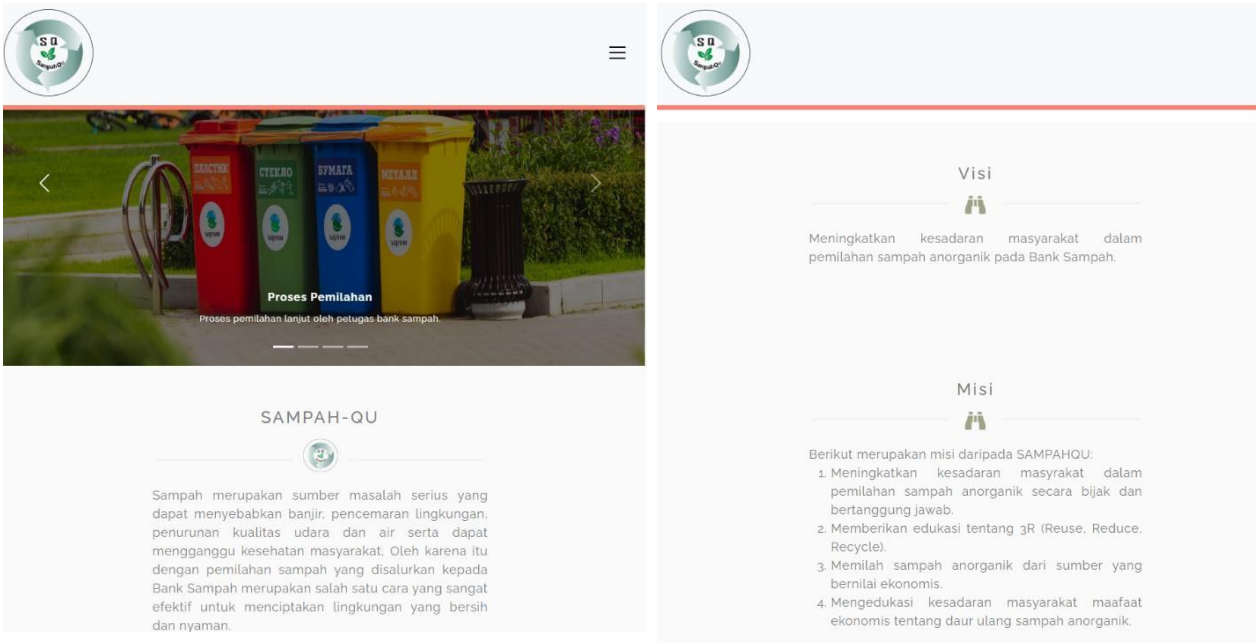

Fig. 1. Home page of the SampahQu application

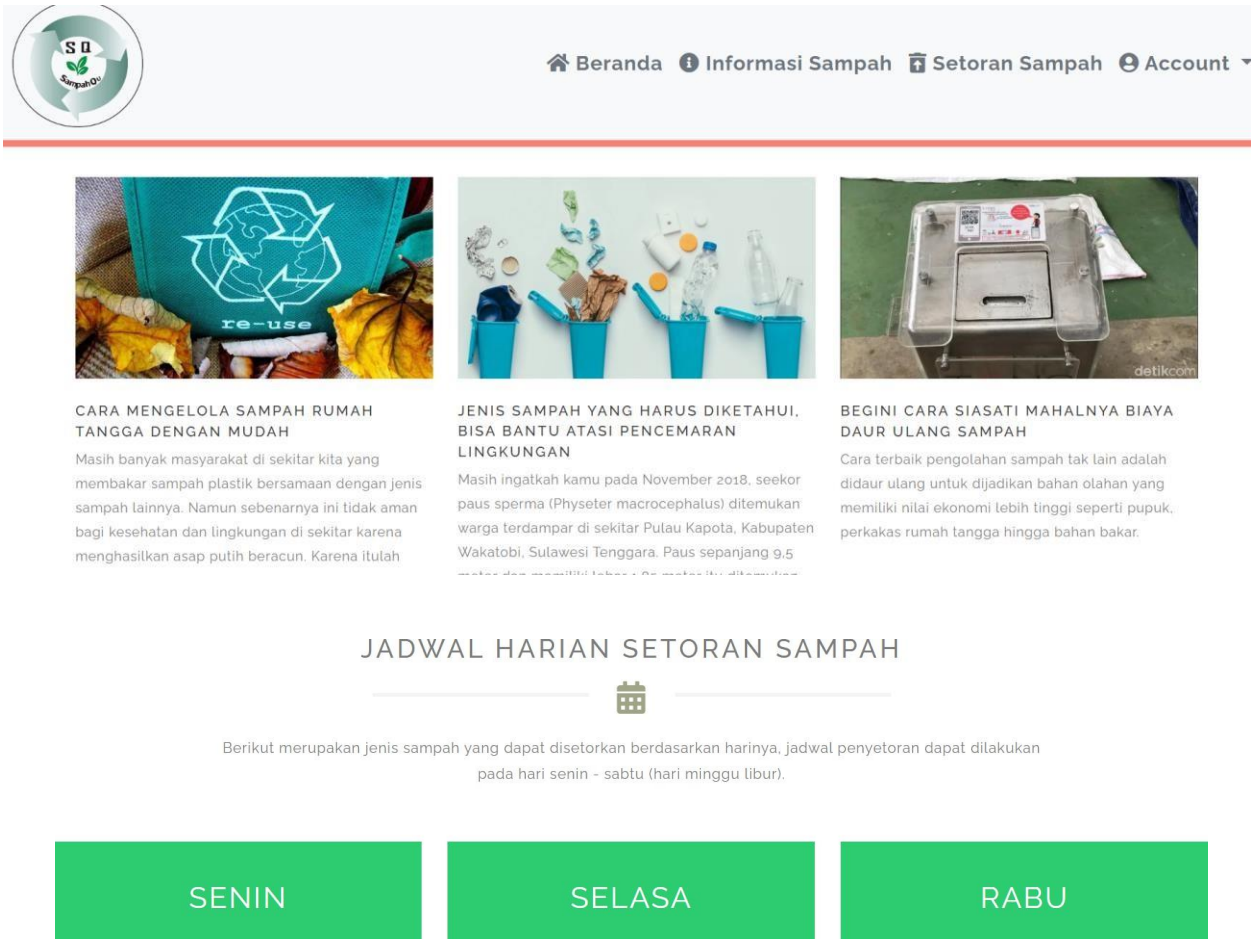

Fig. 2. News and information regarding waste and deposit schedule

Fig. 3. New user activation menu display

After the activation process, the waste bank administrators can record the type and quantity of deposited waste through the *deposit data* menu, as illustrated in Fig. 4. Within this menu, users are required to enter the depositor's name (based on previously stored user data), the category of waste, the date of deposit, the weight of the waste (in kilograms), and, if applicable, the percentage of price deductions

allocated for the waste bank's operational purposes. The recorded deposit results can subsequently be viewed in the depositor's transaction list, as presented in Fig. 5.

Fig. 4. Waste deposit data menu display

Fig. 5. User deposit list

Meanwhile, the waste bank administrator may also assist customers in withdrawing funds through the withdrawal data menu, as illustrated in Fig. 6.

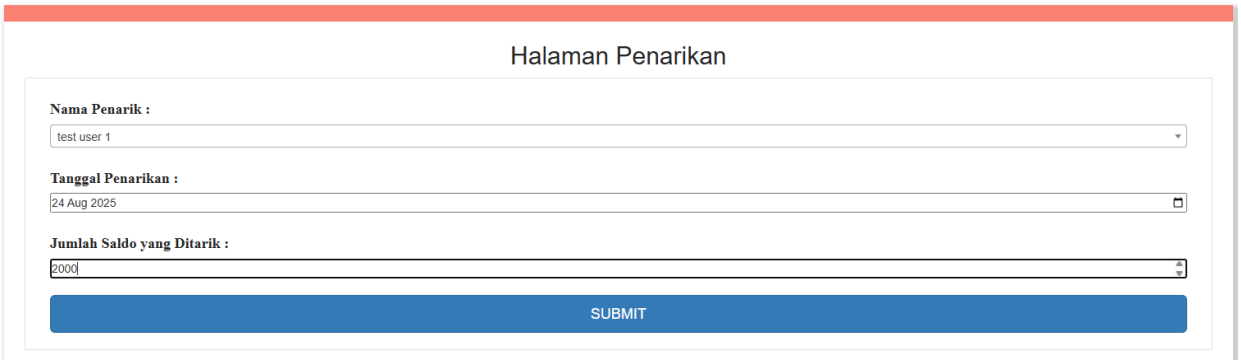

Fig.6. Withdrawal page

Waste bank administrators can also monitor the amount of waste stock collected, as seen in Fig. 7.

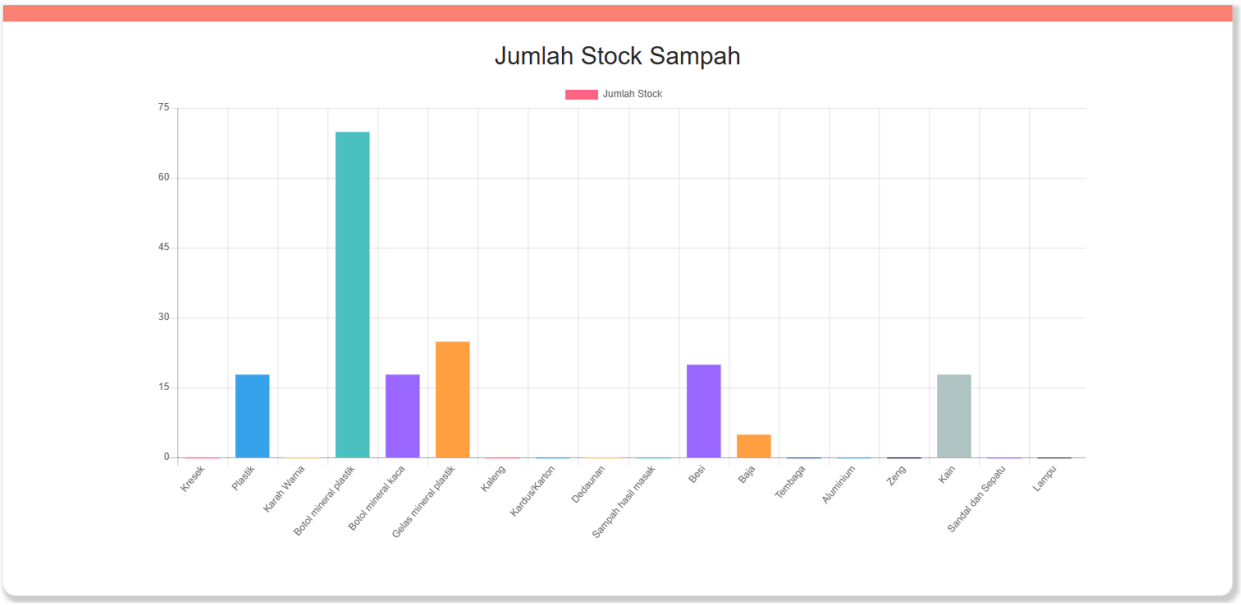

Fig. 7. The amount of waste stock by type

By utilizing the web-based application *SampahQu*, waste bank administrators are able to save time in recording customer transaction data, both for deposits and withdrawals. This time efficiency is achieved because, prior to the use of the application, administrators were required to manually record transaction data in customer passbooks and waste bank logbooks. In addition to saving time, errors in recording and balance calculation can also be minimized, as the application stores waste price data and automatically calculates customer balances. The benefits of the application are also experienced by *SampahQu* as a collector, since editing waste price data in accordance with prevailing market prices can be carried out more easily. Furthermore, waste bank customers are able to quickly view their waste savings balance, as illustrated in Fig. 8.

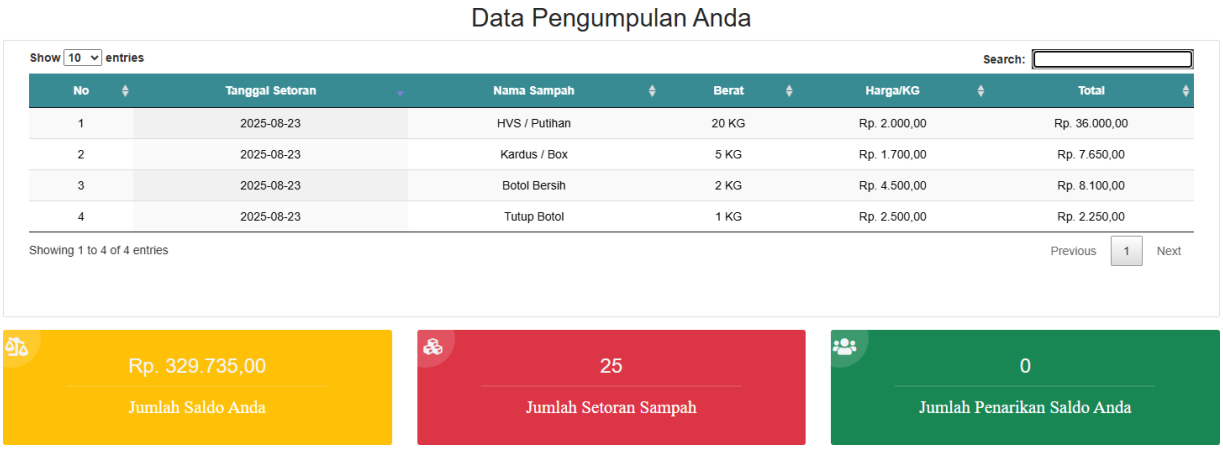

Fig 8. Customer balance

CONCLUSION

The "SampahQu" application has been enhanced by incorporating SampahQu's vision and mission statements on the main page, as well as providing additional information regarding waste and the waste deposit schedule. Furthermore, waste bank administrators are now able to make corrections in the event of data entry errors and can also monitor the quantity of waste stock through graphical representations. Through the implementation of the web-based "SampahQu" application, waste bank administrators are able to streamline the process of recording customer transaction data, including both deposits and withdrawals. This improvement in efficiency is primarily due to the elimination of the previous manual recording system, in which administrators were required to enter transaction data separately into customer passbooks and waste bank logbooks. Beyond enhancing time efficiency, the application also reduces the likelihood of errors in transaction recording and balance calculation, as it stores waste price data and automatically generates customer balances. Moreover, the application provides advantages for "SampahQu" as a collecting entity, since adjustments to waste price data in accordance with current market values can be conducted more efficiently.

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