

Capacity Building on Waste Management and TrashGo Application Utilization for the Community in Joglo, Surakarta

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Abstract

Background: The transaction mechanism for scrap items designates collectors as the purchasing party and community members or scavengers as the selling party. In operating their business, they still rely on manual methods, involving circulating door-to-door and relying on phone calls from regular customers. The current situation requires residents to wait for collectors to circulate their area and leaves them uninformed about the unpredictable and unstable pricing of scrap goods.

Aims: This study aims to provide education provision regarding waste and scrap, followed by a workshop detailing the operation of the TrashGo application that was developed during prior activities.

Methods: Asset-Based Community Development (ABCD) which consists of five stages: discovery, dream, design, define, and destiny.

Result: Participants understood the business side of waste and scrap. Both collectors and the community were able to effectively utilize the TrashGo application for conducting scrap material transactions. A 95% level of understanding regarding the scrap business and application usage was achieved, signifying the training's success and utility.

Conclusion: Data from questionnaires filled out by all participants show that this activity's targets were met. Based on the satisfaction survey, it can be concluded that participants were pleased and felt supported by the program.

A. Introduction

Scrap materials are often categorized as waste. Waste itself is defined as material that has lost its utility value, is unserviceable, unwanted, or constitutes effluent resulting from anthropogenic activities, rather than a natural phenomenon (Rodrigues et al., 2023). In Indonesia, littering is prevalent everywhere, particularly within metropolitan regions, and this has evolved into a substantial problem (Fariz et al., 2024). The issue of solid waste in Indonesia represents a critical concern that intersects with social, economic, and cultural dynamics. Almost every city in Indonesia encounters obstacles in managing its solid waste (Masruroh et al., 2022). Discarded goods are typically defined as used articles that are no longer utilized, and are usually disposed of, combusted, or left to accumulate. Such items are prevalent in both residential areas and commercial settings (Maslim et al., 2023).

By adopting an innovative methodology, post-consumer waste can be channeled into prospective business opportunities, considering the substantial market demand for secondary raw materials (Oktayessofa et al.,

2024). For entrepreneurs operating in the scrap collection industry, these materials can be leveraged as a substantial revenue stream through commercial trading, encompassing items like paper, plastic, iron, aluminum, brass, or copper (Oktayessofo et al., 2024). Within the Hanafi school of thought (madhhab), sale and purchase of used, damaged, or scrap items is permissible. Nonetheless, if these scrap materials are traded even if their value is not fixed by standard pricing, but because they are traded frequently within the community and provide benefit, their price must be clearly specified (Herlina et al., 2022). The trade of discarded materials primarily involves intermediaries (collectors) acquiring materials from households or scavengers (Setyadi et al., 2024). The presence of middlemen in buying discarded materials, particularly plastics, contributes significantly to municipal waste reduction efforts and aids the broader sustainability movement (Nallapaneni et al., 2023). Given the absence of standardized regulations governing the trade of used materials, pricing is set unilaterally by collectors at the point of purchase (Abidin et al., 2022). This dynamic leads to discrepancies in the buying and selling prices across different collectors (Novianti et al., 2025).

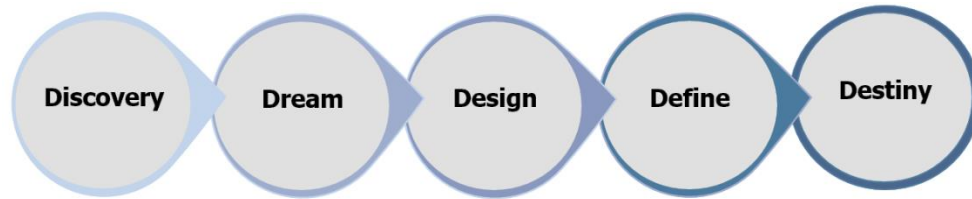
A survey was conducted by the team among a number of scrap dealers near Surakarta City. Their business activities remain dependent on manual collection techniques and customer reliance through telephone communication. Among their grievances are difficulties in material sourcing; calls for collection requests are not received daily. They average only 4-5 days of mobile collection per week, with no guarantee of daily customer contact. Additionally, accumulating 3-4 quintals of waste (mostly plastic and cardboard) necessitates a full workday. Considering these issues, a holistic and integrated approach is required. The proposed intervention involves developing a mobile application designed to enhance the efficiency of material collection and secure a more consistent supply stream for collectors, thereby increasing their income. Furthermore, this system assists the community in easily locating nearby collectors and identifying the specific types of recyclable materials they accept.

Asset-Based Community Development (ABCD) is a community-driven, sustainable development approach. More than merely mobilizing a specific community, this approach focuses on how to connect micro assets with the macro environment (Asyahidda et al., 2024). The ABCD premise is that communities can drive their own development processes by identifying and mobilizing existing, yet often unidentified, assets (Astawa et al., 2022). Thus, communities can respond to challenges and create social improvements as well as local economic development (Wajdi et al., 2024). Essentially, formal and informal social assets are key pillars in fostering individual participation and involvement in community development (Rahmawati et al., 2024). These assets empower communities by giving them a voice in decision-making processes that affect their daily lives (Najamudin & Fajar, 2024). By leveraging both of these social assets, communities can plan and execute programs and activities that align with their needs and expectations (Aji et al., 2024). In this context, formal social assets provide structure and resources, while informal social assets encourage a spirit of mutual cooperation (*gotong royong*) and togetherness. Through the ABCD method, these two social assets are synergized to empower the community (Ridhani & Priyadharma, 2023).

The activity was intended to educate the community on conducting scrap transactions via a developed application. This project delivered a workshop for both residents and collectors on using the resulting TrashGo application. This activity's process utilized the ABCD method to empower the community by identifying and leveraging its inherent strengths and potential. Its main objective is to build independence and sustainability by encouraging the community and scrap collectors to rediscover their strengths, use local assets, and integrate these assets to their fullest potential to achieve well-being and shared goals.

B. Methods

The methodology applied in this community engagement program is Asset-Based Community Development (ABCD), intended to build capacity within the community by leveraging existing assets and potential (Suprihatiningsih & Istikhomah, 2023). The initial stage of the five phase asset identification process for facilitators is the discovery phase (assessment), aimed at comprehending the underlying strengths of the community (Yuriananta & Asteria, 2024). The Dream phase is centered on expressing communal hopes and aspirations. The Design stage then sees the community jointly developing strategies and approaches to achieve these goals (Andianto et al., 2023). The Define phase emphasizes executing the plans to leverage community assets, spanning activities from socialization to collective cooperation. The concluding Destiny (Evaluation) phase provides a mechanism for ongoing learning and evaluation of the project's advancement (Setyadi et al., 2025). Figure 1 presents the various phases involved in the ABCD approach.



(Bela et al., 2025)

Figure 1. Stages in the ABCD Method

Four elements must be met within the ABCD approach: discovery, design, mobilization, and evaluation (Setyadi et al., 2025).

1. Discovery Phase

The initial phase involves a process to identify assets held by the scrap collector community within the municipality of Surakarta. These identified assets encompass knowledge, operational experience, and existing infrastructure.

- a. Knowledge and Experiential Assets: Documenting the expertise and prior knowledge of collectors and secondary material distributors related to their proficiency in using mobile applications.
- b. Infrastructural Assets: An appraisal of technological infrastructure possessed by scrap dealers and distributors, specifically smartphones, personal computers, and other internet-supporting equipment.

2. Dream Phase

The phase moves from leveraging past information, assets, and program successes to envisioning and defining future targets and objectives for waste management. These community aspirations require prioritization based on the specific assets and strengths available within the Joglo Urban Village.

3. Design Phase

Building on the preceding asset identification, the next action is to formulate a mobile application training program that accommodates the working hours of the collectors.

4. Define Phase: Workshop Implementation

During this phase, the community engagement program will primarily address two key domains, specifically:

- a. IT Literacy Enhancement: A structured training initiative aimed at providing foundational knowledge of information technology, with an emphasis on mobile platforms for scrap material commerce.
- b. Practical Application Operation Skills: training that covers the administration and utilization of the system across all user roles: administrator, collector, and end-user.

5. Destiny Phase: Monitoring and Evaluation (M&E) and Continuous Improvement

Following the conclusion of the training, an evaluation is carried out to assess the program's overall impact and effectiveness. This evaluation is conducted via the following aspects:

- a. Skill reflection for collectors: Assessing the proficiency of collectors in utilizing the developed application, observed through system registrations and completed transactions.
- b. Skill reflection for users: Evaluating end-user capability in operating the developed application. Monitoring ranges from initial registration to the final sales transaction with collectors.
- c. Participant feedback: Collecting feedback via a participant-filled questionnaire, concentrating on the advantages and constraints experienced throughout the activity.
- d. Follow-up and Mentoring: Offering continued support to participants needing extra guidance in application management. This program is envisioned as a continuous initiative, enabling successful participants to serve as peer mentors.

C. Results and Discussion

1. Results

1.1 Discovery Phase: Identification of Community Assets and Potential

The current observational data showed that the existing system for scrap collection was entirely conventional; collectors moved around physically or waited for phone communication from clients. This method is slow-paced, requiring an average of 4 to 5 days of circulation just to gather a minimal quantity of scrap materials (around 3 to 4 quintals/300-400 kg). Among the grievances voiced by residents wishing to sell their recyclables are the necessity of waiting for scrap collectors to physically come to their residences and the volatile nature of material pricing.

Concerning the facilities and infrastructure available to scrap collectors, all were found to own smartphones; however, a portion of these devices utilize outdated Android operating systems. Internet or Wi-Fi access has been established in several collectors' residences; however, a portion of them continue to utilize mobile data plans on their individual smartphones. The presence of readily available internet access will simplify the process of operating the TrashGo application. Most residents who usually rely on scrap collection services possess their own Wi-Fi connections via subscriptions to a specific internet provider.

1.2 Dream Phase

Through a focus group discussion with community stakeholders, the most accessible opportunity, commonly known as the 'low-hanging fruit', was identified as the development of the economic assets owned by the Joglo Urban Village, Surakarta. From the discussion results, it was found that stakeholders in Surakarta, specifically scrap collectors expressed a desire for technology utilization to streamline their work.

1.3 Design Phase

Before the program began, a five-day observation period was carried out among the community and scrap collectors. Observations were conducted at the scrap collectors' business premises by the entire team, supported by three students, to acquire the information needed for this community service process. A survey was also performed targeting community members who often sell scrap items to collectors to document the obstacles they have encountered.

1.4 Define Phase

The socialization and training program on waste and scrap materials and on using the TrashGo application for community and collectors was conducted in Joglo Urban Village, Surakarta City, on October 25, with subsequent sessions on November 1 and 9, 2025. During the education session on waste and scrap materials, a presentation was delivered by Nani Irma Susanti, assisted by Adnan Terry Suseno. The education covered understanding which waste materials can be sold to generate income and which can be recycled into various goods. All participants meticulously reviewed the material delivered by the speaker. This session included a question-and-answer discussion involving participants, guided by a moderator. A discussion and sharing was held where community members engaged in waste utilization enterprises shared their experiences regarding transforming scrap into valuable, marketable items. Figure 2 displays documentary photos taken during the first session.



Figure 2. Socialization Session Documentation

The training session on using the TrashGo application was guided by two lecturers and assisted by students. This session commenced with installing the developed application and continued through the operational procedures. Participants were divided into two groups, collectors and users, to ensure the activity process

ran effectively. The training for collectors was conducted by Heribertus Ary Setyadi, while the training for community members was guided by Yusuf Sutanto. Figure 3 displays documentary photos taken during the second session.



Figure 3. Application Operation Workshop Documentation

Questionnaires were completed by both the participants and the Joglo Surakarta village officials at the conclusion of the activity. A final group photograph was then taken, as shown in Figure 4, which features the community service team alongside the participants.



Figure 4. Documentation: Group Photo Session with the Team and Participants

1.5 Destiny Phase

Upon the conclusion of all activities, an evaluation phase was implemented to assess a program's impact and effectiveness. This evaluation is conducted through several steps, including:

- 1) Participant capability evaluation: Assessing understanding of how to operate the TrashGo application to facilitate scrap material transactions. Participant comprehension is evident through the accounts they have created and the transactions performed during the trial run.
- 2) Participant feedback: Gathering input from both scrap collectors and the community concerning the advantages and challenges faced throughout the duration of the activity.
- 3) Follow-up and Mentoring: Offering continuous support to participants experiencing constraints in using the application. The program is designed as a sustainable initiative, enabling proficient participants to effectively share their knowledge with colleagues.

The developed TrashGo application, utilized as a training resource in this activity, features three distinct user types: administrators, collectors, and end-users (the community). Figure 5 illustrates the initial application display that appears after the required download and execution process.

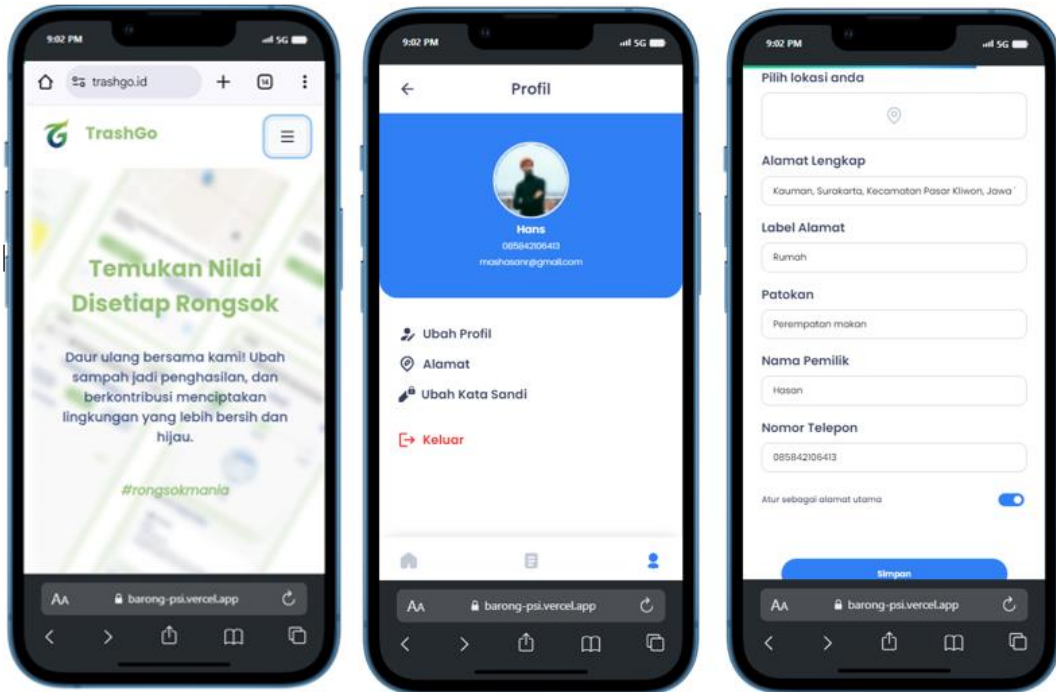


Figure 5. TrashGo Application Initial Display

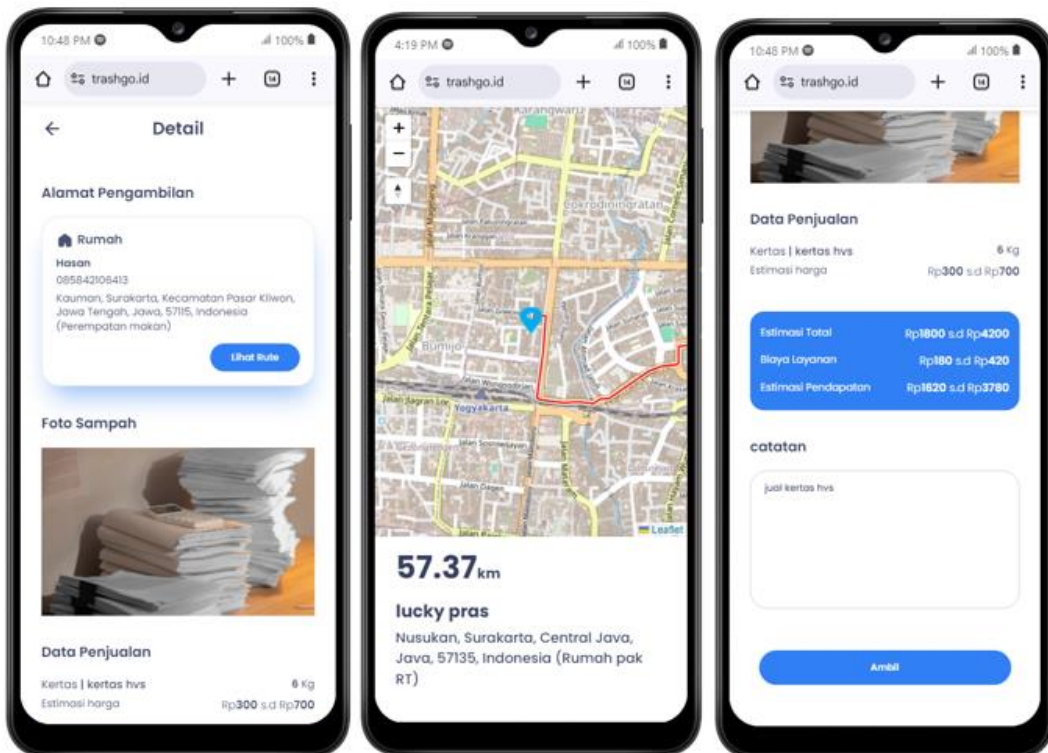


Figure 6. Various Sales Transaction Displays

Based on community service activity objectives, which included waste business education and training on using the TrashGo application, indicators and achievement targets were determined and are presented in Table 1.

Table 1. Activity Plans and Targets

| Objective | Performance Indicators | Performance Targets |
|--|--|---|
| To expand knowledge regarding the scrap material business and to comprehend how to operate the TrashGo application for managing and conducting scrap material buy-and-sell transactions. | Success indicator shows 90% of participants understood waste and scrap business aspects. | Participant comprehension regarding the waste and scrap material business reached 96%. |
| | Participants are already registered in the TrashGo application system. | All participants have registered accounts in TrashGo application. |
| | Total of 90% of scrap collectors demonstrated an ability to perform transactions on TrashGo application. | All collectors possess the capability to perform transactions using TrashGo application. |
| | Community members capability to perform sales transactions using application reached 90%. | Metric for community capability in utilizing application for sales transactions achieved 95%. |

Data collected from participant satisfaction questionnaires demonstrate that the community service program was successfully received and met all expectations. Figure 7 presents the graph summarizing a processed questionnaire results.

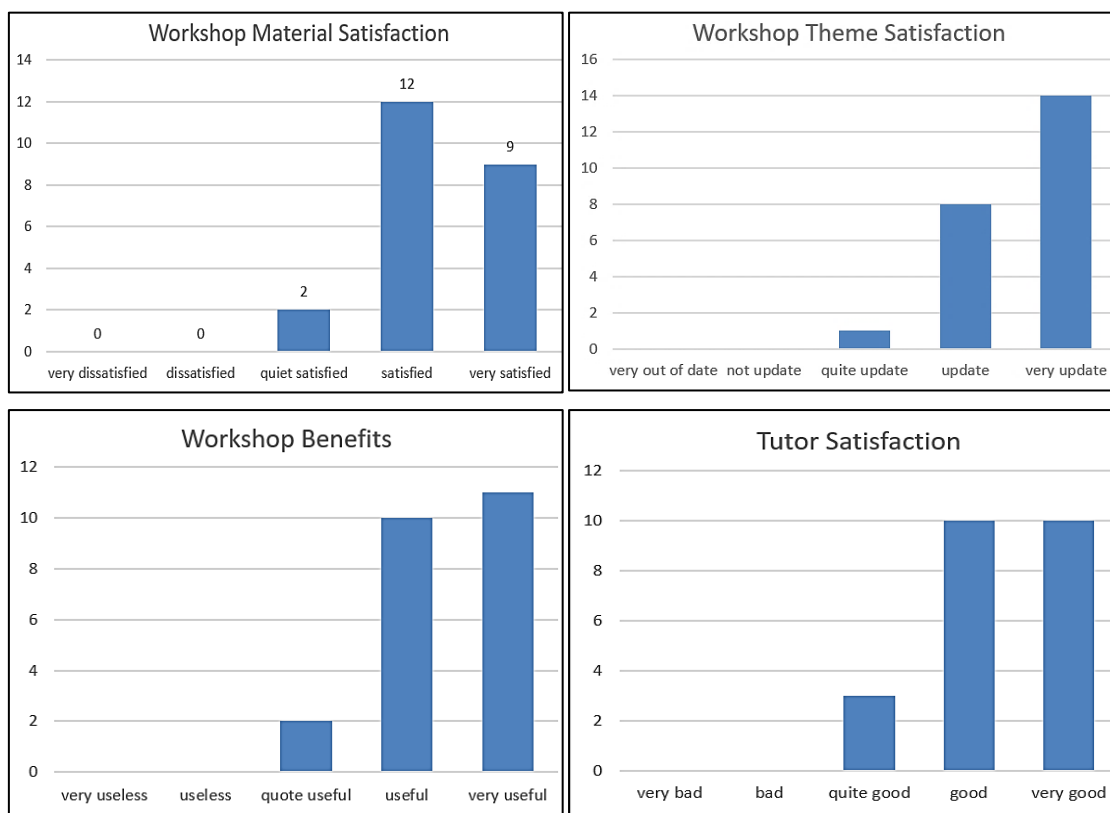


Figure 7. Questionnaire Results Chart

2. Discussion

A literature study regarding waste management and reusable goods has raised participants' awareness and willingness to segregate their waste. Focus is placed on selecting household and industrial waste with resale value. Participants have consequently gained a better understanding of the environmental impact caused by persistent, non-decomposable waste. A series of three training sessions was implemented to familiarize the community, administrators, and users with the TrashGo application. There was a notable transition in participants' digital literacy, as they progressed from being unfamiliar with Android systems to being

proficient in application installation. Due to its streamlined design, the TrashGo application enabled participants to rapidly acquire the necessary skills to navigate the interface in their respective roles.

Utomo and Fauzi published an article detailing the development of a web platform facilitating the buying and selling of waste materials. The system incorporates functionalities like material collection, information dissemination, reward points, sales modules, waste segregation, and a waste savings program. The study primarily emphasizes the management of communal waste banks over independent collectors (Utomo & Fauzi, 2023). Putra et al. (2023) developed a mobile application called 'Go-Trash' in their research (published in proceedings) to address and improve solid waste management efficiency in Surabaya City. This Android-based application merely offers information regarding nearby collection points, accepted recyclable materials, and waste minimization tips. The system's primary emphasis lies in general waste management strategies. Rizal and Ardiansyah, in their community service publication, reported on a workshop aimed at educating the public on sorting and processing organic and inorganic waste. The program included a practical training session focused on manufacturing paving blocks derived from plastic refuse (Rizal & Ardiansyah, 2025).

Prior research and public service projects lack integrated features for transparent pricing information and public profiles of scrap dealers. Moreover, a critical absence is noted in providing a map location feature for customers to pinpoint the exact pickup location for materials. The resulting system provides public accessibility to up-to-date scrap item prices. We also integrated a location-sharing feature to optimize the logistics of item collection. This functionality utilizes a Location-Based Service (LBS) to ascertain the real-time positions of collectors and customers, thereby simplifying the process for dealers to find clients ready to sell their discarded goods.

2.1. Implications

Figure 8 displays the summarized target achievements in graphic form, based on data collected from the 23 attendees of the community service program.

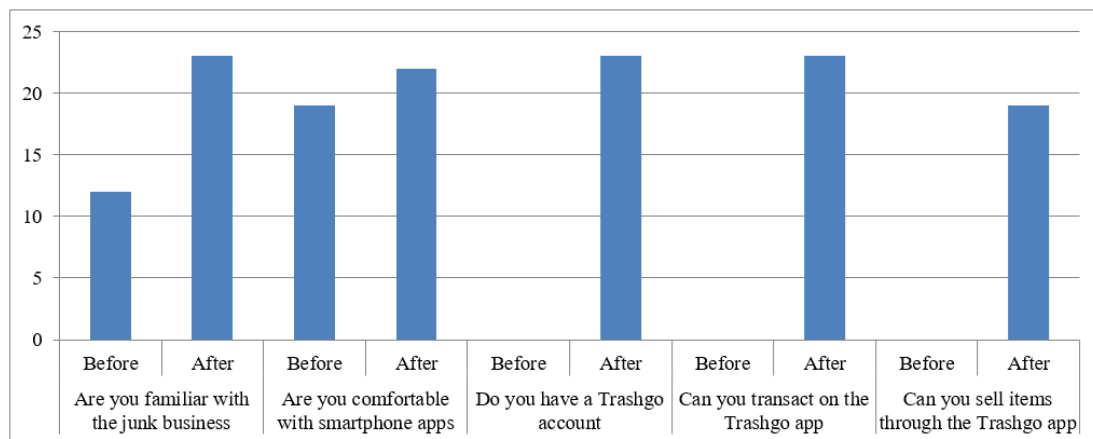


Figure 8. Activity Achievement Chart

2.2. Research Contribution

As explained in the introduction, previous studies conducted by other researchers have not produced an application as comprehensive as TrashGo. Specifically, two studies focused only on waste banks, and others lacked support for LBS functionality. None of the previous community service activities have generated an application or conducted training for the use of a developed application. The developed TrashGo application offers several key features: price transparency, an LBS feature to simplify waste collection for collectors, an integrated rating system (similar to online transportation apps), and intuitive transaction management for easy use.

2.3. Limitations

Due to the requirement for a relatively new Android version, some participants were unable to install the TrashGo application. The application demands a minimum of Android 11; therefore, devices with older operating systems must be updated accordingly.

2.4. Suggestions

The application's functionality could be maximized by scaling its use to a city level, rather than being confined to the village scope. City-wide implementation, driven by relevant stakeholders, is necessary to achieve broader reach.

D. Conclusion

This community service activity, aimed at providing education on the waste and scrap business and training on using the TrashGo application, proved highly beneficial for both collectors and the general public. This conclusion is substantiated by questionnaires completed by all participants and officials from the Joglo village authority (*kalurahan*). All participants have demonstrated an understanding that waste and scrap materials can be developed into a viable business. Furthermore, all collectors and community members now possess accounts and are capable of operating the application developed by the team.

E. Acknowledgment

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F. Author Contribution Statement

NIS (Chairperson) and ATS (Member) delivered the educational module focused on monetizing waste and scrap materials. Concurrently, YS and HAS facilitated the workshop sessions, which detailed the entire process from application installation to conducting transactions and generating reports. The TrashGo application development utilized during this activity was a collaborative effort led by YS, ATS, and HAS, supported by student assistants.

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