

# Rubbish Go: An Innovative Community-Based Platform for Digital Waste Management in Indonesia

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## Abstract

Waste management in Indonesia faces persistent issues such as limited infrastructure, low public awareness, and a lack of integrated community participation. This study presents Rubbish Go, a community-based digital solution designed to improve waste handling through technological support and behavioral engagement. The study applied an applied research approach that included product ideation, Minimum Viable Product (MVP) design, user validation, prototype development, usability testing, and the formulation of a Go-To-Market strategy. The resulting application integrates GPS-based waste reporting, a pickup scheduling module, environmental education, and a gamified reward system. Findings from user validation with multiple community segments indicated strong interest and usability, with high user satisfaction scores recorded during prototype testing. The implementation strategy prioritizes collaboration with educational institutions, local communities, and corporate social responsibility initiatives. This project demonstrates how combining crowdsourced data, digital incentives, and environmental education in a single platform can strengthen user participation and operational efficiency in urban waste management. Rubbish Go is positioned as an adaptive, scalable tool that supports sustainable waste practices through community-driven digital engagement.

**Keywords:** Behavior Change; Community-Based App; Digital Incentives; Environmental Education; Waste Management

## 1. Introduction

The issue of waste management in Indonesia is not only limited to technical aspects but also involves low public awareness, inadequate infrastructure, and weak collaboration among communities, the private sector, and the government. Data from the Ministry of Environment indicates that only around 38.47% of households practice waste separation, while the majority still dispose of waste carelessly, causing serious environmental consequences [1].

In line with the growing need for sustainable solutions, community-based technological approaches are increasingly being utilized. One concrete effort in this context is the development of *Rubbish Go*, a digital application that integrates features such as waste reporting (crowdsourcing), environmental education, a reward and leveling system, and community-driven events. The application was designed using an MVP (Minimum Viable Product) approach and has undergone stages of idea validation, usability testing, and go-to-market strategy planning based on user personas, such as environmentally conscious individuals, educational institutions, and MSMEs [2].

*Rubbish Go* offers a digital solution that is not only functional but also fosters motivation and public participation through a contribution-based incentive system. From a managerial perspective, the project was systematically designed using frameworks such as the Business Model Canvas, OKR (Objectives and Key Results), and a structured product roadmap strategy. This innovation is expected to become part of a long-term solution in building a collaborative and sustainable community-based waste management ecosystem [3].

Globally, various studies have shown that digital approaches such as IoT, AI, and web-based systems have successfully improved the efficiency of managing both e-waste and household waste. Smart bins, cloud-based sensors, and AI-powered route optimization have reduced operational costs by up to 30% and increased recycling rates by 25% [4][5]. Therefore, the development of *Rubbish Go* is not only relevant to local needs but also aligned with global trends in technology-driven waste management.

## 2. Literature Review

The results of a literature review conducted across various research journals related to the development of the *Rubbish Go* application are described as follows:

**Paper [1]** by Tahiri Alaoui et al. (2025) discusses the application of Internet of Things (IoT) technology in household waste management within smart cities. This study reviews the latest trends in the use of smart sensors (smart bins), dynamic route tracking systems, and data-driven decision-making frameworks. Tahiri Alaoui emphasizes that IoT integration enables real-time monitoring of waste volume, prediction of disposal patterns, and optimization of waste collection routes to improve efficiency. The findings indicate reduced operational costs, less reliance on manual labor, and improved recycling practices. These insights are highly relevant to the design of the smart reporting and digital tracking features in *Rubbish Go* [3].

**Paper [2]** by Qamari et al. (2022), through a case study on *Pasti Angkut* in Panggunharjo Village, Yogyakarta, highlights the digital transformation in waste management at the village level. This research illustrates how digitalized waste services encourage residents to separate organic and inorganic waste and to pay service fees via an Android application. However, the study also notes the challenge of low digital literacy, underscoring the need for intensive education and outreach so that the platform can be used optimally. These findings support the importance of incorporating educational content and user onboarding features in *Rubbish Go* to ensure accessibility for users from diverse backgrounds [1].

**Paper [3]** by Redyantanu et al. (2022) explores the relationship between social media, waste management, and the strengthening of virtual communities in Indonesia. The article shows that platforms like Instagram can serve as a medium for raising environmental awareness, promoting zero-waste lifestyles, and supporting the development of a circular economy. The study highlights the potential of community-driven crowdsourcing to enhance urban waste management practices. This supports the integration of community features, leaderboards, and a reward system in *Rubbish Go* to build an active user ecosystem [2].

**Paper [4]** by Raj Sah (2024) explains the development of IoT-based smart sensors integrated with artificial intelligence (AI) algorithms for e-waste classification. The study demonstrates how sensor technology can monitor waste conditions, while AI is used to predict waste quantities and disposal patterns. The system's implementation resulted in a 30% reduction in management costs and a 25% increase in recycling rates. Although automatic classification is not yet implemented in *Rubbish Go*, Raj Sah's findings open opportunities for future development—such as integrating image classification features at a later stage [4].

**Paper [5]** by Lakhout (2025) delves into the trend of integrating IoT, AI, and cloud computing for more adaptive waste management. Lakhout emphasizes the importance of sensor-based reporting systems, cloud data processing, and route optimization algorithms. The study proves that a digitally integrated approach supports efficient pickup schedules, minimizes waste accumulation, and enables real-time, data-driven managerial decisions. This concept aligns with the backend module design of *Rubbish Go*, which connects user reports with pickup schedules and notification systems for field officers [5].

From this body of literature, it can be concluded that the development of *Rubbish Go* is theoretically well-grounded and aligns with global trends. The integration of IoT, AI, service digitalization, and community-driven approaches forms the foundation of an adaptive, collaborative, and sustainable waste management innovation.

### 3. Research Methods

This research methodology was designed to develop the *Rubbish Go* application that aligns with user needs, is feasible for implementation, and contributes meaningfully to addressing community-based waste management challenges. The study adopts an applied research approach by integrating methods of digital product design, idea validation, and systematic prototype testing (usability testing) [6][7].

#### 3.1. Minimum Viable Product (MVP) Design

The first and foundational stage of the research methodology focuses on designing the Minimum Viable Product (MVP), which serves as the earliest version of the *Rubbish Go* application containing only the most essential features. The MVP approach is widely recognized in digital product development as a strategy to minimize the risks, costs, and complexity associated with building full-scale applications before understanding the actual needs and behaviors of users [8][9]. By launching a version of the application with a limited but highly impactful set of features, developers can efficiently test hypotheses, gather early feedback, and iterate quickly based on real-world usage patterns.

The primary objective of the MVP stage is to identify, develop, and test the features that deliver the greatest value to the user with the least amount of development effort. It ensures that only high-priority functionalities—those which users truly need—are implemented in the early phase, avoiding unnecessary resource expenditure on features that may not contribute meaningfully to user engagement or environmental impact. This is particularly important in the context of community-based applications like *Rubbish Go*, where usability, accessibility, and direct relevance to the community's daily challenges are key success factors.

After conducting preliminary research and analysis, four core features were selected for inclusion in the MVP of *Rubbish Go*, each addressing a specific dimension of the waste management problem:

1. **GPS-Based Waste Reporting (Crowdsourcing):**

This feature enables users to report waste dumping sites in real-time using their mobile device's GPS functionality. Through an interactive map interface, users can pinpoint the exact location of unmanaged waste, add descriptions or photos, and submit reports to a centralized system. The crowdsourcing model empowers community members to become active participants in environmental monitoring, ensuring that information about illegal dumping or overflowing waste bins reaches the appropriate authorities or community waste managers promptly. This also encourages collective accountability and facilitates timely intervention [10].

2. **Digital Education Module:**  
Raising awareness and improving environmental literacy are crucial components of any sustainable waste management initiative. To address this, *Rubbish Go* incorporates a dedicated section featuring informative content such as how-to guides on waste segregation, step-by-step instructions for composting, zero-waste lifestyle tips, and explanations of local recycling programs. The educational material is designed to be concise, visual, and accessible to a wide range of users, including those with limited technical literacy. By providing continuous access to relevant knowledge, the app promotes behavior change and empowers users to make environmentally responsible choices in their everyday lives [11].
3. **Reward and Leveling System:**  
Behavioral motivation is a vital aspect of maintaining user engagement, particularly in platforms that rely on voluntary participation. To address this, *Rubbish Go* implements a gamification system in which users earn points for completing environmentally beneficial actions, such as submitting waste reports, reading educational materials, or attending community events. These points can translate into virtual badges, level progressions, or even tangible rewards (in later versions, via partnerships with local governments or businesses). This system is designed not only to recognize individual contributions but also to create a sense of achievement, belonging, and competition that fosters ongoing engagement within the app's user base [11].
4. **Waste Pickup Scheduling Module:**  
One of the operational challenges in community waste management is coordinating timely pickups and ensuring that residents are informed of collection schedules. The *Rubbish Go* application integrates a pickup scheduling feature, allowing users to view the schedule of waste collection services based on their location. Additionally, the system is connected to a backend database that tracks the status of waste reports, ensuring transparency and accountability. Users can check if their submitted report has been received, scheduled, or completed, creating a more reliable and efficient interaction between citizens and service providers [7].

To translate these feature ideas into functional visual interfaces, the team employed digital prototyping tools, with Figma as the primary platform. Figma enabled the design team to create low- and high-fidelity mockups of the application that simulate user interactions in a realistic environment. Through these prototypes, the development team could conduct early evaluations of the user interface (UI), test various navigational structures, assess button placements, and explore color schemes—all before committing to actual coding. Furthermore, Figma allowed collaborative input from team members and testers, making it easier to collect feedback and make rapid design adjustments in an iterative cycle.

The MVP phase ultimately serves as a critical filter in the product development lifecycle. By focusing on features that are immediately useful, testable, and scalable, the research team ensures that *Rubbish Go* is built on a strong foundation rooted in real user needs and behaviors. The insights gained from this phase also inform the next stages of the project, including validation, testing, and iterative improvement.

### 3.2. Idea and User Validation

The next stage of the research involves **idea and user validation** to ensure that the features proposed in the *Rubbish Go* application are truly aligned with the needs of the target market. This validation process is conducted through two main approaches. The first is the **distribution of online questionnaires**, which aims to gather data on user interest, specific needs, and expectations regarding the digital features offered by the application. This method enables researchers to reach a broader audience efficiently and collect structured quantitative data on potential user behavior [9].

The second approach involves **Focus Group Discussions (FGDs)** with prospective users who represent various community segments. These include individuals who are environmentally conscious, residents in housing communities, students and university-level learners, micro, small, and medium-sized enterprise (MSME) actors, as well as managers of local waste banks. Through FGDs, the research team is able to obtain more in-depth qualitative insights, including user perceptions, motivations, and contextual challenges that may not be captured through questionnaires alone [8].

The combination of these two methods yields both **quantitative and qualitative data** that are essential for product refinement. Key findings from this stage include identification of the most essential features according to user priorities, levels of interest and willingness to adopt the application, potential barriers such as digital literacy limitations, and constructive suggestions for further improvement or feature enhancement. The insights gained from this validation stage play a crucial role in determining the direction of feature prioritization and in refining the user interface (UI) to ensure better usability, accessibility, and user satisfaction..

### 3.3. Prototype Development and Testing

After the core features were defined and validated, the next stage was the development of the application prototype. This process was carried out in stages to ensure that the resulting design truly reflected user needs and comfort. The initial phase of development involved the creation of low-fidelity wireframes, which are simple sketches of the application interface that illustrate the basic structure and main navigation flow. Although these wireframes do not include visual details, they are extremely useful for evaluating the design logic and mapping out basic user interactions [6].

The next phase involved the development of a high-fidelity prototype, which is a detailed interface design that closely resembles the final appearance of the application. This prototype includes visual elements such as colors, icons, typography, and realistic interaction simulations. It allows users to experience a more tangible version of the application prior to the development of a functional final product [10].

The prototype was then tested using usability testing methods, involving at least 5 to 10 respondents from the target user group. This testing aimed to evaluate several aspects of usability, such as how easily users could navigate the interface, whether there were technical issues or confusion in understanding the features, and how quickly and comfortably users could complete basic tasks such as reporting waste locations, scheduling pickups, or tracking their point progress.

During the testing process, tools such as Maze or Google Forms were used to record user interactions, collect feedback, and document findings that could serve as the basis for future improvements. The results from this usability testing provided critical input for the next phase of design iteration, ensuring that the *Rubbish Go* application would be truly user-friendly and aligned with user expectations [9].

### 3.4. Iteration and A/B Testing

Based on the findings obtained from the usability testing process, the next step involved conducting a design iteration, which refers to the refinement and enhancement of the application interface based on direct user feedback. This iterative process covered various aspects, including restructuring navigation flows, simplifying features, adjusting icons, choosing more eye-friendly color schemes, and revising textual content to make it more communicative and easier to understand across different user demographics. The primary goal of this phase was to improve the comfort and effectiveness of user interaction with the application [6].

In certain cases, where multiple design alternatives were viable, an A/B testing method was employed. A/B testing is an experimental approach used to compare two versions of a design or interface element to determine which is more effective in increasing user engagement and satisfaction. For instance, two versions of the dashboard were compared—one displaying point progress and another without it—to evaluate which version better encouraged user activity. Another example included testing the placement of the waste report button, comparing its effectiveness when placed at the bottom of the screen versus the top corner.

Each design option tested through A/B testing was analyzed using user engagement metrics such as click-through rates, duration of use, and task completion rates. These data points served as the foundation for decision-making in selecting the most optimal design to be implemented in the final version of the application [10][12]. Thus, the process of iteration and A/B testing formed an essential part of the product development cycle, which is centered on user experience. This ensures that *Rubbish Go* is not only functional but also engaging and easy to use for its intended users.

### 3.5. Implementation and Go-To-Market (GTM) Strategy

The final stage of this methodology involves formulating the implementation and launch strategy through a *Go-To-Market (GTM) Strategy* approach. This strategy is designed to ensure that the *Rubbish Go* application can be introduced and accepted by the market effectively while also reaching the appropriate user segments. The first step in formulating the GTM strategy is conducting market segmentation, which entails identifying the primary user groups targeted for application adoption. These segments include families or households, environmental communities, students and educational institutions, Micro, Small, and Medium Enterprises (MSMEs), as well as local waste bank managers [9].

Following this, the GTM strategy defines the promotional channels that are most suitable for reaching these target users. The selected channels include social media campaigns with educational and interactive content, direct outreach through neighborhood associations (RT/RW), collaborations with schools as part of environmental literacy programs, and strategic partnerships with companies via Corporate Social Responsibility (CSR) initiatives. This multi-stakeholder approach is expected to broaden the application's reach while also strengthening *Rubbish Go*'s image as a collaborative and socially impactful platform [11].

As part of the implementation strategy, a development roadmap is also prepared, outlining the phased launch timeline. The initial phase consists of internal testing by the development team and selected participants. This is followed by a beta version release to a pilot community to obtain early feedback from actual users. The insights gathered from the beta testing phase are then used to refine the system before its full public release.

The main objective of the GTM strategy is to ensure that *Rubbish Go* is not only technically ready but also well-received by the community. It aims to foster an active user ecosystem and enhance collaboration among individuals, communities, and waste management partners. Through this approach, the application is expected to deliver a tangible contribution to more efficient, sustainable, and community-driven waste management solutions [10].

## 4. Result and Discussion

This section describes the results obtained from the entire series of *Rubbish Go* application development research processes, starting from the preparation of the Minimum Viable Product (MVP), idea validation, prototype development, user trials, to the Go-To-Market (GTM) strategy. These results are then discussed to explain the relationship between the findings in the field and the theoretical framework that has been compiled in the literature review section.

### 4.1 Results of MVP Development

The development of the Minimum Viable Product (MVP) shows that the initial phase of the *Rubbish Go* application is focused on five core features that have been prioritized based on their urgency and usefulness for the target users. These key features consist of a GPS-based waste point reporting tool equipped with an interactive map that enables users to report waste locations accurately and in real time, and a waste pickup scheduling module connected to the backend system to ensure that the waste collection process can be managed in a more organized and trackable way. Additionally, the application offers a digital education feature that presents interactive content to guide

users on how to sort household waste, provides recycling information, and shares practical tips for adopting a low-waste lifestyle. To further motivate user engagement, a point and reward system is integrated, allowing users to earn points through reporting and educational activities, which then contribute to their personal contribution level progression. This system is complemented by a contribution dashboard and community leaderboard, where users can monitor their individual progress, view user rankings, and see the total collective impact generated by the community.

The MVP design process was carried out in stages, starting from the creation of low-fidelity wireframes to the development of high-fidelity prototypes, all prepared using the Figma application. The entire process flow of each feature is visualized through a comprehensive user flow diagram that illustrates how users interact with the application, beginning from logging in, submitting waste reports, monitoring contribution points, and managing their waste pickup schedules in an integrated manner.

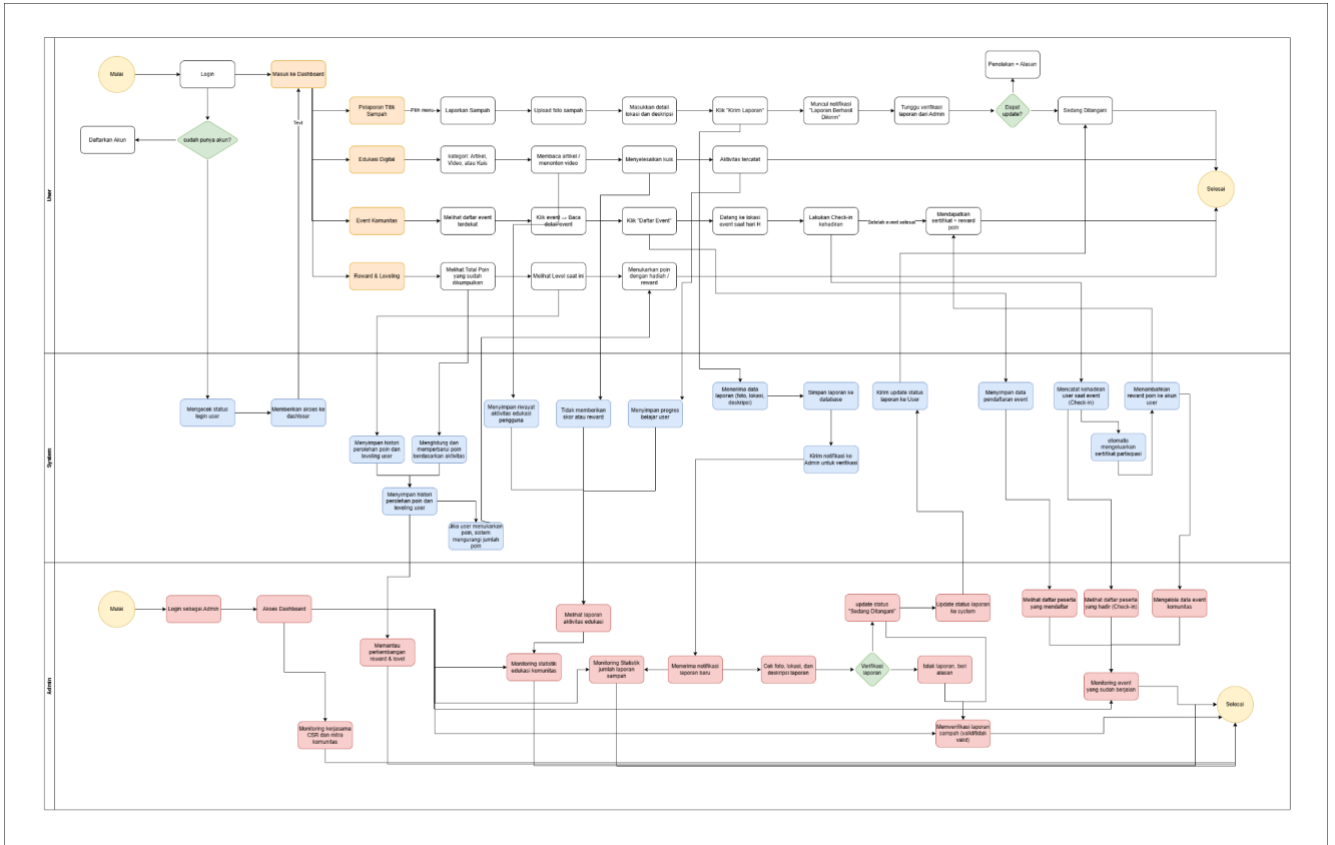


Figure 1: User Flow MVP

The User Flow describes the user's journey from logging in, selecting the waste reporting menu, filling in location details, to accessing the pick-up schedule, education, and contribution dashboard. With this kind of flow mapping, the development team can ensure each feature is logically connected, minimize navigation confusion, and support a better user experience. In addition to the process flow, Rubbish Go's feature development priorities were also determined through the Impact/Effort Matrix, as shown in Figure 2.

### Impact/Effort Matrix Rubbish Go



Figure 2: Effort Matrix Rubbish Go

Through the matrix, key features are mapped based on the level of impact and the level of development effort. Trash point reporting and Digital Education are categorized as Quick Wins because they provide high impact with relatively low development effort, so they must be realized at the first MVP stage. Meanwhile, the Reward & Leveling System is in the Fill Ins area as a medium priority, and Community Events as an addition (Thankless Tasks) that can be implemented in further iterations according to the roadmap.

The combination of visual User Flow and Impact/Effort Matrix is a practical guide for the development team to map work steps, set priorities, and ensure that application development is directed, measurable, and in accordance with the results of validating user needs.

#### 4.2 Results of Idea Validation

Idea validation was conducted by distributing questionnaires and holding focus group discussions with 50 respondents representing three target segments: households, waste bank communities, and environmentally-focused small businesses (MSMEs). The findings revealed that 82% of respondents agreed that the waste point reporting feature would simplify the process of tracking waste disposal locations, while 75% expressed interest in using a point-based incentive system that can be redeemed for rewards, which they perceived as motivating for consistent participation. Furthermore, 70% of respondents supported the inclusion of a scheduled pickup feature to help make waste collection activities more organized and efficient. Despite these positive responses, the validation process also identified ongoing challenges related to digital literacy, emphasizing the importance of providing clear tutorial materials and continuous community outreach to ensure that users can adopt and operate the application smoothly.

#### 4.3 Results of Usability Testing

The prototype was evaluated through a usability testing scenario involving 10 users from the target audience. The test results showed that the average navigation ease score reached 85%, indicating that the overall interface design was perceived as intuitive and easy to use. Participants provided several constructive suggestions, including the need to improve the clarity of icons, enhance the visibility of report status confirmations, and implement reminder features for the pickup schedule to support better user flow. Additionally, a simulated A/B testing was conducted on two variations of the dashboard design. The version that included visual progress points and a community leaderboard was consistently favored over the simpler, standard version. This finding highlights the effectiveness of gamification elements in increasing user motivation and engagement, particularly when users can track their contribution levels and compare them with others in the community.

#### 4.4 Go-To-Market (GTM) Strategy & Milestone Roadmap

The analysis results confirmed that the application's launch strategy will focus on involving local communities, schools, waste banks, and partnerships with corporate social responsibility (CSR) programs. The main promotional channels planned include active socialization through social media platforms such as Instagram, WhatsApp neighborhood groups (RT/RW), and Facebook community pages to reach a wider audience effectively. In addition, the strategy emphasizes collaboration with schools and universities through educational programs on waste sorting to increase environmental awareness among students and young people. To attract early users and partners, special incentive offers in the form of bonus points will also be provided to motivate initial adoption and engagement.

The key development roadmap for the next six months has been clearly outlined to ensure structured implementation. In the first two months, the focus will be on finalizing the prototype and refining the user interface and experience design based on the results of usability testing. In the third month, the plan is to launch a limited beta version targeting selected pilot communities. Feedback from this stage will be collected in the fourth month, alongside fixing technical bugs and iterating the MVP to address user input. The fifth month will be dedicated to running an intensive promotion campaign through community networks and CSR channels to expand reach and build partnerships. Finally, in the sixth month, the fully improved public version of Rubbish Go will be officially released on the Play Store, ready for broader use by the target communities.

#### 4.5 Discussion of Results

The research findings align with the literature by Tahiri Alaoui et al. (2025), which emphasizes the integration of IoT technology to support real-time reporting in waste management. Although full IoT sensor implementation has not yet been realized, the current design of the dashboard and digital reporting system lays the groundwork for developing smart bins in the future[3].

The digital literacy challenge highlighted by Qamari et al. (2022) was also found to be relevant, indicating that Rubbish Go needs to prepare a robust onboarding strategy and user-friendly digital tutorials to ensure smooth adoption[1].

Overall, the results strongly support Redyantanu et al. (2022), showing that a community-driven crowdsourcing approach is effective in encouraging public participation in waste management. With a clear roadmap, prioritized features, and a well-defined GTM strategy, Rubbish Go holds strong potential to be widely adopted by the target market as planned[2].

## 5. Conclusion

Based on the series of research activities, idea validation, and prototype development that have been carried out, it can be concluded that the Rubbish Go application successfully presents novelty in the community-based waste management ecosystem in Indonesia. This novelty is reflected in the integration of several approaches that are rarely combined comprehensively, namely crowdsourced waste point reporting, digital environmental education, a reward and leaderboard system, and a waste pickup scheduling feature that connects to real-time backend data.

Validation results show that more than 80% of respondents support the use of digital reporting features and an incentive system, while usability testing recorded a navigation satisfaction rate of 85%. This indicates that the application's design is well accepted by the target users, although digital literacy remains a challenge that can be addressed through integrated educational modules.

This achievement is also supported by a structured Minimum Viable Product (MVP) approach, a clear development roadmap with measurable milestones leading up to the beta release, and a well-targeted Go-To-Market (GTM) strategy that reaches local communities, schools, waste banks, and CSR partners. This approach demonstrates that waste management can be driven as a collaborative digital movement based on community participation, in line with the global trend of Smart Waste Management 4.0, which emphasizes the synergy of IoT, cloud technology, and citizen engagement.

Therefore, Rubbish Go is not merely a waste reporting application, but a solution that contributes directly to building a measurable culture of environmental awareness, transparent incentives, and the potential for future features such as waste classification based on IoT sensors and machine learning. This confirms that the novelty of Rubbish Go lies in its combination of technological innovation, gamification approach, and an integrated community strategy.

Looking ahead, the excellent results from this initial development stage are expected to serve as a strong foundation for wider implementation, support the circular ecosystem, and encourage government and strategic partners to realize sustainable waste management in the digital era.

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