

IMPLEMENTATION OF ROCKET STOVES AND EDUCATION ON WASTE SORTING AS AN EFFORT TO MANAGE RESIDUAL WASTE IN RW 07, LEBAKWANGI VILLAGE, ARJASARI DISTRICT, BANDUNG REGENCY

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Abstract

Residual waste management is an environmental issue faced by residents of RW 07, Lebakwangi Village, Arjasari Subdistrict, Bandung Regency, as indicated by open burning, disposal on vacant land, and limited source-based waste sorting. This community service activity aimed to implement a Rocket Stove as a more controlled alternative for residual waste treatment and to provide waste-sorting education. The activities consisted of observation, coordination with local leaders, construction of one Rocket Stove unit on waqf land, operational testing, waste-sorting education, and evaluation through observation and pre-test–post-test assessment of 37 participants. The field test showed a processing capacity of approximately 35–55 kg of dry organic/light mixed waste per cycle and a temperature of around 600°C within 10–15 minutes, with visually lower smoke than open burning. The mean participant score increased from 59.67% in the pre-test to 86.80% in the post-test, representing an increase of 27.13 percentage points. A total of 35 households were recorded as using the facility. The main limitation was accessibility for residents living farther from the waqf land. Therefore, additional processing points, continuous education, and stronger community-based management are recommended to broaden the program impact.

Keywords: Rocket Stove, Waste Management, Waste Sorting Education, Community Empowerment, RW 07 Lebakwangi

A. INTRODUCTION

The issue of household-level residual waste remains an unresolved environmental challenge in various residential areas across Indonesia, including RW 07, Lebakwangi Village, Arjasari District, Bandung Regency. Population growth, increasing household activities, and community consumption patterns have led to a continuously growing volume of waste over time. This condition becomes increasingly complex when it is not matched by the availability of adequate management facilities and infrastructure. Improperly managed materials can cause

various environmental problems, such as air pollution, soil and water contamination, unpleasant odors, and breeding grounds for various disease vectors. The national waste management framework also emphasizes the importance of systematic waste reduction and handling (Law of the Republic of Indonesia Number 18 of 2008).

Based on initial field observations conducted in RW 07, Lebakwangi Village, household waste management still faces several obstacles. The majority of residents rely on open burning as a short-term solution to reduce waste accumulation around their homes. This practice occurs due to limited waste transportation and processing facilities, as well as an unoptimized integrated waste management system within the community. Open burning is generally carried out by piling waste in open spaces and burning it without regard to the waste types or environmental impacts.

In addition to open burning, some community members still dispose of waste indiscriminately in vacant lots, gardens, and waterways. This habit leads to waste accumulation and reduces environmental cleanliness. When waste is dumped into waterways, it obstructs water flow and increases the risk of waterlogging and flooding during heavy rainfall. Meanwhile, waste dumped in vacant lots generates foul odors, disrupts environmental aesthetics, and serves as a potential breeding ground for insects and disease-bearing animals. This situation highlights that the waste problem in RW 07 is linked not only to limited facilities but also to community habits and behavior regarding household waste handling.

The practice of open burning also generates smoke and various pollutants that can degrade surrounding air quality. Smoke from waste burning spreads to residential areas, especially when burning occurs near homes. This condition reduces community comfort and poses potential health risks if repeated over time. Therefore, open burning needs to be reduced and gradually transitioned toward a more controlled management system that considers environmental and public health aspects (Rivai et al., 2023).

Waste management issues are fundamentally not just technical challenges regarding the availability of disposal sites, processing equipment, or transport facilities. These issues are closely tied to community environmental literacy and awareness. Environmental literacy can be understood as the community's capacity to comprehend environmental issues, understand the impacts of their behaviors, and maintain awareness to take actions that preserve environmental sustainability. In the context of household waste management, environmental literacy is a critical aspect, as behavioral change is essential for a waste management system to operate sustainably.

One simple behavior community members can adopt is sorting waste at its source. Waste sorting is the process of separating waste based on its types and characteristics, such as organic, inorganic, and residual waste. Source sorting is crucial because it facilitates downstream waste processing. Organic waste originating from food scraps and biodegradable materials can be directed toward composting or other organic treatment methods. Meanwhile, inorganic waste that still retains functional or economic value can be collected for reuse or distributed to recyclers.

Residual waste consists of materials that can no longer be reused through simple sorting or specific processing. This type of waste requires further handling to prevent open burning or indiscriminate disposal. By sorting at home, the volume of residual waste can be identified

more clearly. Sorting also helps residents realize that not all waste needs to be burned or discarded carelessly. Thus, waste sorting education is a vital component in transforming community habits regarding household waste handling (Putri et al., 2026).

Without proper sorting, organic, inorganic, and residual waste become mixed together. This condition makes processing more difficult and inefficient. Materials that could otherwise be utilized risk being discarded or burned alongside remaining waste. Furthermore, mixing these waste streams increases the overall volume of residual waste requiring final handling. Therefore, implementing household-level waste sorting must be done consistently and accompanied by an understanding of its goals and benefits.

Community education serves as a necessary approach to support this behavioral change. Education aims not only to convey information about waste categories but also to foster an understanding of environmental and health impacts, as well as proper waste management practices. Through direct, face-to-face education, community members gain opportunities to discuss issues, share challenges, and understand practical waste sorting implementation based on real conditions in their neighborhood.

Waste management interventions must also account for local community conditions and capacities. Implementing overly complex or costly technologies can hinder sustainability once programs end. Hence, there is a need for relatively simple, appropriate technology that residents can easily understand and adapt to local environmental conditions. One alternative technology that can assist with residual waste handling is the Rocket Stove.

The Rocket Stove is an appropriate technology that utilizes controlled combustion principles through a combustion chamber and chimney design that supports more efficient burning. This design aims to enhance combustion efficiency, resulting in less smoke compared to conventional open burning. This technology has been applied in various community service initiatives as an alternative solution for addressing residual waste issues and improving combustion efficiency (Fahmi Yahya & Agustya Ningrum, 2023; Syapranata et al., 2025).

The implementation of the Rocket Stove in this activity is not a new invention developed by the student team. Rather, it adapts best practices previously implemented across various university community service projects and other community settings. The student group, together with the Field Supervisor, applied this technology by tailoring it to the specific challenges identified in RW 07, Lebakwangi Village. Consequently, this initiative focuses on adoption, implementation, education, and assistance in appropriate technology to help the community manage residual waste.

Utilizing the Rocket Stove is expected to serve as an alternative to reduce open burning practices. Through its structured combustion chamber and chimney system, burning can be executed in a more controlled manner than open ground burning. However, operating a Rocket Stove must still be paired with an understanding of acceptable waste types, operational procedures, safety guidelines, and prior waste sorting. Technology cannot stand alone without behavioral changes from its users.

Therefore, applying the Rocket Stove in this initiative is combined with waste sorting education. Merging technological and educational approaches aims to produce a more comprehensive intervention. Community members receive not only access to the Rocket Stove unit but also an understanding of why waste must be sorted before processing. In this way,

residents can appreciate the relationship between waste sorting, residual waste reduction, and responsible waste technology utilization.

Educational activities are structured to help residents distinguish organic, inorganic, and residual waste based on everyday characteristics. Common household waste examples are used to make materials easily understandable and directly applicable. Through this approach, waste sorting is envisioned not as an extra burden, but as a simple daily habit within households.

In addition to delivering education, the student group conducted communication and coordination with RW leaders and local residents. Coordination was necessary to determine implementation locations, operational mechanisms, and post-program Rocket Stove management. Involving the community from the preparation phase helps foster a sense of ownership toward the provided facility. This sense of ownership supports the long-term sustainability of the technology after the service program concludes.

Program execution also prioritized safety considerations. Combustion involves inherent risks if performed without proper procedures. Therefore, residents were educated on equipment placement, safe distances from structures and flammable materials, supervision during burning, and post-burning protocols. This understanding ensures the technology introduces no new safety risks to residents or the surrounding environment.

The presence of the Rocket Stove is also intended as an educational tool regarding systematic waste management. Residents can directly observe that handling waste requires a multi-step process from sorting and collection to final treatment. By providing a hands-on technological example, socialized information transitions from purely theoretical concepts to practical solutions linked to real daily conditions.

In the long term, this project hopes to encourage improved waste management habits across RW 07. Behavioral change cannot occur instantly through a single event. However, providing education, supportive facilities, and community involvement serves as an initial step toward building shared awareness. Program sustainability heavily relies on the commitment of residents and neighborhood leaders to maintain sorting habits and responsibly manage the provided facilities.

Based on these considerations, the student team and Field Supervisor executed a community service initiative combining Rocket Stove implementation with waste sorting education for residents of RW 07, Lebakwangi Village. This activity responds directly to residual waste management issues identified during field observations. The applied approach integrates appropriate technology provision with community knowledge enhancement to deliver broader, sustainable benefits.

The objectives of this initiative are to: (1) provide a Rocket Stove unit as an alternative facility for residual waste processing with more controlled combustion and lower smoke output compared to open burning; (2) improve RW 07 residents' understanding of waste classification and sorting; (3) increase community awareness regarding the impacts of indiscriminate dumping and burning; (4) encourage household-level source sorting; and (5) demonstrate an appropriate technology application that can be utilized and developed according to local environmental needs.

Through these activities, RW 07 residents are expected to benefit not only from the Rocket Stove facility but also from gaining practical knowledge for daily life. Technology

implementation is intended to align with community behavioral changes in sorting and managing waste. Ultimately, this initiative represents a step toward building a cleaner, healthier, and more organized environment.

In conclusion, implementing the Rocket Stove and waste sorting education in RW 07, Lebakwangi Village serves as a simple intervention model suitable for adaptation or replication by other neighborhood units facing similar residual waste challenges. Program success is measured not merely by facility construction, but by how well the community understands, accepts, utilizes, and maintains the equipment while incorporating daily sorting practices. Through synergy among students, field supervisors, local leaders, and residents, waste management efforts can progress toward a more orderly, responsible, and sustainable system.

B. LITERATURE REVIEW

Environmental Literacy Theory

Environmental literacy is understood as the community's capacity to comprehend various environmental issues, realize the impacts of their behaviors, and maintain awareness to take concrete action toward preserving environmental sustainability. In the context of household waste management, environmental literacy plays a crucial role because community behavioral change is essential for a waste management system to operate consistently and sustainably. This aspect is closely linked to establishing the habit of sorting waste at its source based on its types and characteristics. Enhancing community environmental literacy is generally conducted through direct educational approaches to facilitate information delivery and encourage interactive discussions regarding local environmental conditions. Therefore, strengthening environmental literacy serves as a vital foundation for transforming community waste-handling habits, preventing indiscriminate dumping or open burning. Indicators:

- Understanding Waste Categories: The ability to recognize and distinguish between organic, inorganic, and residual waste categories.
- Awareness of Source Sorting: Awareness and concrete action to separate waste at the household level prior to disposal or processing.
- Awareness of Environmental Impacts: Understanding the negative consequences of indiscriminate waste dumping or burning on health and the environment.

Appropriate Technology Theory

Appropriate technology refers to simple technical solutions designed in accordance with the conditions, capabilities, and environmental needs of the local community, enabling independent utilization and management. Implementing this technology avoids overly complex or costly mechanisms, preventing barriers to long-term usage. One tangible application is the Rocket Stove a device utilizing specialized combustion chamber and chimney principles to support more controlled residual waste burning. The design aims to enhance combustion efficiency, thereby reducing smoke emissions compared to conventional open burning. Furthermore, this technology is implemented through a participatory process of adoption, education, and assistance to generate a positive impact on environmental management. Indicators:

- Operational and Maintenance Ease: The community's capacity to comprehend operational mechanics, run, and maintain the equipment independently.

- Combustion Efficiency: Achieving optimal burning temperatures alongside a visible reduction in smoke volume compared to open burning.
- Accessibility and Community Acceptance: Convenient facility locations for residents, paired with the community's willingness to utilize the infrastructure communally.

C. RESEARCH METHODOLOGY

The community service activity was conducted in RW 07, Lebakwangi Village, Arjasari District, Bandung Regency, on August 1, 2026. The selection of RW 07 as the project location was based on initial observation results showing challenges in household waste management, specifically in handling residual waste. These conditions were characterized by ongoing open burning practices, waste disposal on vacant lots, and unoptimized waste sorting by type. These environmental conditions and limited waste management facilities served as the foundation for implementing appropriate technology in the form of a Rocket Stove, accompanied by waste sorting education.

The target audience for this activity was the community of RW 07, with a primary focus on residents living around the waqf land designated for the Rocket Stove unit construction. Selecting nearby residents as the primary target was done because this group is closest to the facility and is expected to play an active role in utilizing, monitoring, and maintaining it after the community service program concludes. Nevertheless, the waste sorting educational materials were aimed more broadly at the RW 07 community so that the knowledge provided was not limited only to residents living near the construction site.

The community service project utilized a participatory approach by involving students, the Field Supervisor (DPL), RW officers, community leaders, and local residents. A participatory approach was chosen because waste management issues require not only physical facility solutions but also community engagement and behavioral change. Through this approach, the community was involved from the stages of problem identification, location selection, construction, education, trial testing, to evaluation. Community involvement was expected to enhance a sense of ownership toward the built facility while supporting program sustainability.

In general, the program was executed across four main stages: observation and initial socialization, Rocket Stove construction, waste sorting education, and evaluation. These four stages were carried out sequentially, while remaining adaptable to field conditions. Each stage maintained specific objectives and activity indicators to ensure program execution proceeded systematically and in line with community needs.

The first stage was a preparation phase conducted to gain a clear picture of the actual waste management conditions in RW 07. Observations were carried out directly by inspecting residential environmental conditions, waste disposal patterns, potential waste accumulation sites, and household waste handling habits. Observations were also made to evaluate the availability of existing waste management facilities and infrastructure, including waste collection and disposal amenities.

In addition to field observations, informal interviews were conducted with the RW Chairman, community leaders, and several residents. The interviews aimed to gather information regarding existing waste management problems, community waste disposal or burning habits, waste transport availability, and community understanding levels regarding

waste sorting. The interviews were also used to gauge community feedback regarding the planned Rocket Stove implementation as an alternative solution for residual waste handling.

The observation and interview results were subsequently used to determine project requirements and formulate intervention models tailored to community conditions. This stage was crucial to ensure the program was not based merely on implementation assumptions, but genuinely addressed real-field challenges and community needs. Thus, the Rocket Stove implementation and waste sorting education were designed to maintain direct relevance to the problems faced by RW 07 residents.

During the preparation phase, coordination with RW officials was also conducted to determine the Rocket Stove construction site. Coordination aimed to select a shared, easily accessible location for the community. Following joint discussions, waqf land was chosen as the construction site for the Rocket Stove unit. This land selection was based on space availability, community access, and the potential for communal facility utilization.

Initial socialization was then delivered to RW officials and residents residing around the location. The socialization included explanations of project goals, waste problem background, core Rocket Stove concepts, technology implementation benefits, the importance of waste sorting, and expected community participation forms. At this stage, it was also clarified that the Rocket Stove was not intended to replace the entire waste management system, but rather to serve as an alternative option for proper residual waste handling.

The second stage was the construction process of one Rocket Stove unit on the waqf land agreed upon with RW officials. Construction activities were carried out in stages, adjusting to site conditions and available materials. Prior to construction, the site was prepared by clearing the area, positioning the unit, and ensuring the construction zone allowed for safe operational conditions.

Construction began with foundation laying for the Rocket Stove unit to provide structural stability and prevent shifting or damage caused by soil conditions or usage. Following foundation completion, the main body and frame of the Rocket Stove were assembled according to the prepared design, as documented in Figure 1.



Figure 1. The frame assembly process and leveling measurement of the Rocket Stove structure.

Source: Processed by Researcher, 2026

The next stage involved installing insulating materials on areas requiring heat protection. The insulating material helps maintain combustion chamber temperatures and supports a more optimal burning process. Once the main structure was fully assembled, work was completed on the chimney section to serve as an exhaust path for combustion gases.

The construction process engaged students and local community members according to project needs. Involving the community during the construction phase aimed to provide residents with direct, hands-on experience regarding the fabrication process and primary components of the Rocket Stove. Furthermore, this involvement was expected to enhance public understanding of how the facility operates, ensuring residents not only recognize its final form but also understand the basic function of each part. Community participation in the structural assembly process is shown in Figure 2.



Figure 2. Participation of residents and students in the construction process of the Rocket Stove unit.

Source: Processed by Researcher, 2026

Once all components were fully assembled, a physical inspection of the Rocket Stove unit was performed. The inspection ensured that the structure was in proper working condition prior to use. Subsequently, a trial burn was conducted using pre-sorted residual waste. This trial aimed to verify the core functionality of the Rocket Stove and provide the community with a clear demonstration of how to operate the facility.

During the trial, residents received explanations covering operating procedures for the Rocket Stove, preparation steps before ignition, waste types that must be separated, and safety guidelines to observe. The facility's usage was directed to remain under supervision rather than being operated indiscriminately. Safety instructions formed a vital component, as the combustion process entails risks if performed without considering environmental conditions and operational procedures.

Selecting the waqf land as the construction site offered the advantage of allowing communal access for residents. However, this location presented limitations, as not all areas within RW 07 could reach the facility with equal ease. These geographic constraints were factored into the activity evaluation, particularly regarding accessibility and the sustainability of community adoption.

The third stage comprised educational and socialization activities regarding waste sorting. This activity was conducted to enhance public knowledge concerning waste types and proper handling methods prior to downstream processing. Education proved essential, as applying technology without changing community knowledge and behavior risks yielding sub-optimal outcomes.

Educational materials included basic definitions of waste, household waste sources, classifications by type, and distinctions among organic, inorganic, and residual waste. Organic waste was introduced through everyday examples such as food scraps, leaves, and biodegradable matter. Inorganic waste was explained using examples like plastic bottles, packaging, cardboard, and other materials that retain potential for reuse or recycling. Meanwhile, residual waste was defined as waste that requires further processing after initial sorting and recovery efforts have been made.

The sessions emphasized the importance of source-level waste sorting. Sorting at the household level serves as a foundational step to reduce mixed waste streams. Once waste streams become intermingled, recovery and processing become significantly more difficult. Consequently, residents were encouraged to establish a routine of separating waste by type prior to disposal or processing.

Material delivery was conducted face-to-face using interactive lectures, discussions, Q&A sessions, and visual aids. Visual media displayed examples of common household waste, making concepts easier for participants to grasp. Discussions allowed organizers to understand local waste management experiences while giving participants a platform to voice specific challenges.

The education sessions also clarified the connection between waste sorting and Rocket Stove utilization. Residents were informed that not all waste should be fed into the combustion unit. Materials retaining value or recyclability must be separated, while organic waste should be directed to appropriate organic processing methods. The Rocket Stove functions specifically as an alternative method for handling true residual waste requiring final disposal.

An educational approach combining visual media and practical demonstration was chosen to help residents connect theoretical concepts with real household conditions. Participants received not only category explanations but were also guided to identify waste types based on familiar examples. This method aligns with similar community service initiatives that utilize visual aids and hands-on practice for waste sorting education (Putri et al., 2026).

Beyond sorting, residents gained an understanding of environmental hygiene and the need to curb indiscriminate littering. The educational drive reinforced waste management as a shared community responsibility. Households represent an essential starting point, as the majority of waste in residential areas originates from daily domestic activities.

The final stage was activity evaluation. Evaluation assessed the extent to which program objectives were achieved and gauged community responses toward both the Rocket Stove implementation and waste sorting education. It also served to identify operational obstacles encountered during execution, offering insights to refine future programs.

Evaluation proceeded through observation of resident involvement during the construction process, educational sessions, and initial Rocket Stove usage. Observations tracked participant engagement, material comprehension, waste recognition skills, and community usage of the facility. The post-use condition of the facility was also monitored to identify potential technical or non-technical issues.

Complementing field observations, brief interviews were conducted with residents living near the waqf land. Interviews gathered feedback regarding the presence of the Rocket Stove, ease of access, perceived benefits, and operational difficulties. This qualitative input remains

crucial, as technology adoption depends not only on physical construction success but also on community acceptance and operational capability.

Knowledge gains were evaluated using a pre-test and post-test administered to 37 workshop participants. The evaluation tool measured three indicators: understanding of organic, inorganic, and residual waste categories; awareness of household source sorting before disposal; and comprehension of Rocket Stove operations and benefits. Pre-tests were completed before presentation delivery, while post-tests followed the educational and practical sessions.

Data collected from observations, short interviews, and questionnaires were analyzed descriptively. Pre-test and post-test scores were compiled into percentage values to track changes in participant understanding, with mean scores calculated across the three evaluation indicators. Furthermore, field observations recorded community participation, facility usage rates, site accessibility, and operational constraints following initial unit operation.

Descriptive analysis was chosen because the program aimed to map practical achievements and knowledge shifts rather than test causal relationships. Result interpretation accounted for field conditions, facility characteristics, community participation levels, and time constraints. Through this framework, the evaluation measured not merely the physical presence of a single Rocket Stove unit, but also community reception and long-term sustainability prospects.

Overall, the implementation methodology integrated appropriate technology with educational and participatory models. Rocket Stove construction provided physical infrastructure for residual waste handling, while waste sorting education targeted public knowledge and awareness. Combining these approaches delivers broader community benefits than deploying physical facilities alone.

The project recognized spatial constraints, as the Rocket Stove was built at a single location on waqf land. Consequently, findings cannot be generalized across the entire population of RW 07. The primary focus remained providing a practical model of appropriate technology while building household-level waste sorting awareness. The unit serves as a pilot model that can be expanded if the community and neighborhood leaders secure additional resources and express further waste management needs.

Thus, program success is defined not simply by completing the Rocket Stove build, but by community involvement, improved waste sorting knowledge, and a commitment to utilize and maintain the facility. Subsequent evaluation findings can inform future waste management program development within RW 07 or guide similar initiatives in other communities facing residual waste challenges.

D. RESULT AND DISCUSSION

Initial Conditions of Waste Management in RW 07

Initial observations revealed that the primary waste management issue in RW 07 stems from open burning practices around residential homes and waste disposal on vacant lots. This condition is linked to limited transport services, a lack of processing facilities, and sub-optimal resident awareness regarding waste sorting. These findings reinforce the necessity of an intervention combining facility provision with education, as technology without changes in knowledge and habits risks being utilized unsustainably.

Implementation of the Rocket Stove

One Rocket Stove unit was constructed on RW 07 waqf land through a participatory building process with local residents. Trial operations demonstrated that the unit can process approximately 35–55 kg of dry organic/light mixed waste per session. Combustion chamber temperatures reached approximately 600°C or higher within 10–15 minutes. During testing, visible smoke around the device was lower than that of conventional open burning. These findings indicate that a structured combustion chamber and chimney system assist in creating a more controlled burning process, though these results cannot be used to declare the unit emission-free. The physical condition of the completed Rocket Stove unit, ready for operational use, is shown in Figure 3.



Figure 3. The completed Rocket Stove unit constructed on the RW 07 waqf land.

Source: Processed by Researcher, 2026

This thermal performance is comparable to previous community service findings. Butar et al. (2025) reported that a Rocket Stove in Mergowati Village reached an average temperature of 615°C within 13 minutes, while Yulianti et al. (2025) reported temperatures exceeding 600°C by the 20th minute. Thus, reaching approximately 600°C within 10–15 minutes in RW 07 falls within a similar performance range and demonstrates a relatively rapid initial heating time. This comparison is descriptive in nature, as variations exist regarding equipment capacity, material types and moisture content, combustion chamber design, and temperature measurement methods across different activities (Butar et al., 2025; Yulianti et al., 2025).

Waste Sorting Education

The educational activity was attended by 37 residents of RW 07 and covered introductory concepts of organic, inorganic, and residual waste, the importance of source sorting, and the connection between sorting and Rocket Stove usage. Content delivery was conducted through interactive lectures, discussions, Q&A sessions, visual media, and practical hands-on

demonstrations. This approach helped participants connect the material with the types of waste encountered in their daily lives, aligning with the visual- and practice-based educational approach reported by Putri et al. (2026).

The results of the participants' knowledge evaluation are presented in Table 1 and visualized in Figure 4. Scores across all indicators demonstrated improvement following the education sessions, with the most significant change observed in the awareness of source-level waste sorting.

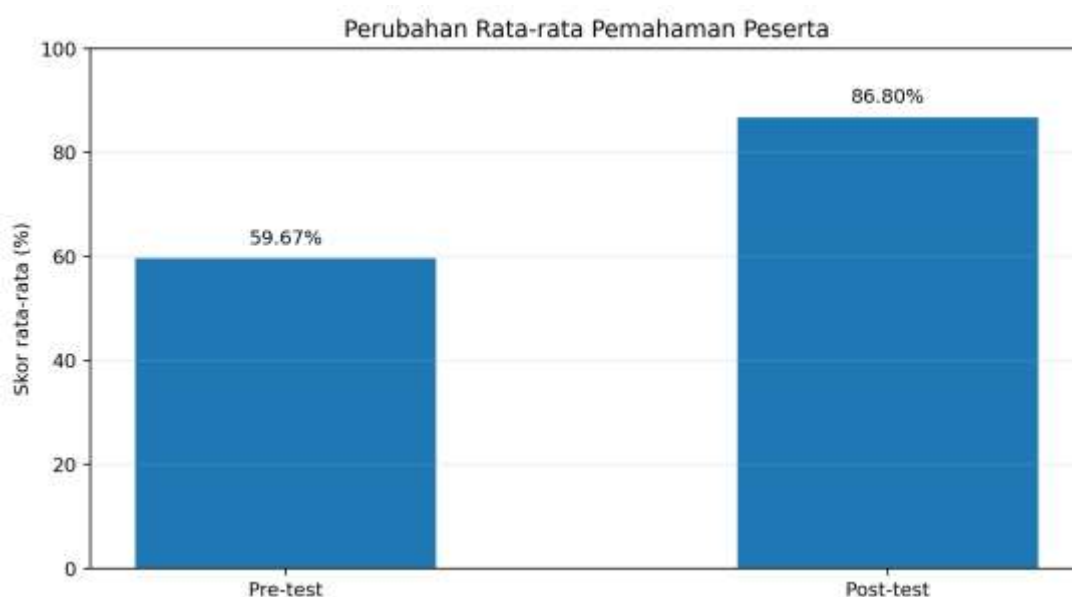


Figure 4. Comparison of average pre-test and post-test scores of waste sorting education participants.

Source: Processed by Researcher, 2026

Table 1. Evaluation Results of Waste Sorting Education Participants' Understanding

Evaluation Indicators	Scored Pre-Test (%)	Scored Post-Test (%)
Understanding of organic, inorganic, and residual waste categories	55,87%	88,30%
Awareness of sorting waste at the source before disposal	64,09%	94,06%
Understanding of the benefits and operation of the Rocket Stove	59,05%	78,04%
Average	59,67%	86,80%

Source: Processed by Researcher, 2026

Note: Scores represent the average percentage of the 37 education participants.

Based on Table 1, the score for awareness of sorting waste at the source increased from 64.09% to 94.06%, or up by 29.97 percentage points, making it the highest increase among the three indicators. Understanding of waste categories increased by 32.43 percentage points, from 55.87% to 88.30%. Meanwhile, understanding of the benefits and working mechanisms of the Rocket Stove increased from 59.05% to 78.04%, or 18.99 percentage points. Overall, the average score increased from 59.67% to 86.80%, resulting in an increase of 27.13 percentage

points. This pattern shows that basic material on waste sorting was more easily received after providing examples and hands-on practice, whereas understanding the mechanism of the device still requires reinforcement through demonstrations and assistance during use.

Program Utilization and Limitations

Post-construction observations show that residents have begun utilizing the Rocket Stove as a shared facility. A total of 35 households were recorded to have used the facility. However, utilization is not yet evenly distributed across RW 07. Residents living near the waqf land can access the facility more easily, whereas residents living farther away tend to still practice independent open burning. This condition demonstrates that the success of a technology is influenced not only by the performance of the tool itself, but also by location accessibility, waste collection mechanisms, and the reinforcement of new habits at the household level.

These findings form the basis for recommendations to develop Rocket Stove sites in more strategic locations and to strengthen ongoing education, including door-to-door approaches for residents who have not yet been reached. Further development needs to consider distance, residential density, location safety, residue collection mechanisms, as well as the parties responsible for operating and maintaining the equipment.

E. CONCLUSION

The community service activity through the implementation of the Rocket Stove and waste sorting education in RW 07, Lebakwangi Village, Arjasari District, Bandung Regency, was carried out as an effort to respond to residual waste management issues at the household level. These issues stem from ongoing open waste burning practices, limited waste management facilities, and sub-optimal community habits regarding sorting waste at the source. Based on the series of activities conducted, this program provided an initial contribution toward introducing an alternative for residual waste handling while increasing community knowledge about the importance of waste sorting.

The implementation of the Rocket Stove resulted in one unit of residual waste processing facility placed on waqf land agreed upon with the RW leaders. Selecting this location allows the facility to be used communally by the community, particularly residents living nearby. The construction of the facility also serves as a application of appropriate technology tailored to local environmental conditions and community needs. Through the construction and testing process, the community had the opportunity to directly learn about the form, function, and basic principles of operating the Rocket Stove for residual waste management.

The implementation results show that the Rocket Stove can be used as an alternative for burning residual waste in a more controlled manner compared to open waste burning. During testing, the combustion process took place inside a chamber designed and equipped with a chimney system. Visually, the smoke produced during operation appeared more controlled than open burning conducted directly in residential areas. However, this condition does not mean that the Rocket Stove completely eliminates emissions or produces pollutant-free combustion. The tool's performance remains influenced by the type and moisture content of the waste, the amount of waste fed into it, combustion conditions, equipment design, and operating methods. Therefore, the Rocket Stove is more accurately positioned as a controlled burning alternative rather than an emission-free technology.

In addition to facility construction, waste sorting education was a vital component of this activity. Education was delivered to the community covering topics such as identifying organic, inorganic, and residual waste; examples of waste by category; the importance of sorting at the source; and the relationship between waste sorting and further processing steps. The material was delivered through face-to-face socialisation, interactive lectures, discussions, and the use of concrete examples and visual media. This approach enabled participants to connect the material provided with the waste conditions they encounter in their daily lives.

The educational activity demonstrated a positive response from the community regarding waste sorting information. Residents gained an understanding that household waste does not have to be entirely burned or discarded, as some waste can still be reused, recycled, or processed through other methods. Understanding the differences between organic, inorganic, and residual waste also serves as an important foundation for determining appropriate waste management actions. Thus, the education not only introduced types of waste but also instilled an understanding of the importance of sorting right from the household level.

The implementation of the Rocket Stove and waste sorting education in this activity share a complementary relationship. The Rocket Stove functions as a tool to help process residual waste, whereas waste sorting acts as the initial step to ensure reusable materials are not mixed with waste designated for final disposal. Sorting also helps reduce the volume of waste entering the combustion process. Therefore, the presence of the facility cannot be separated from the community's daily waste sorting habits.

Although the activity yielded positive results, several limitations need to be noted. The primary limitation relates to the location of the Rocket Stove, which is situated at a single point on waqf land. While this location allows for communal use, accessibility is not uniform for all residents of RW 07. Residents living farther from the site face distance and accessibility constraints, resulting in uneven potential utilization across the RW area.

These access constraints potentially affect the long-term sustainability of the Rocket Stove's use. Residents living far from the location may find it difficult to transport residual waste to the processing site, especially if no organized collection system or waste transportation mechanism is available. This condition may cause some residents to revert to old household waste handling practices, including open burning around their homes. Therefore, a single Rocket Stove unit cannot yet be considered a comprehensive solution to waste problems across all of RW 07.

Furthermore, the relatively short duration of the community service activity presents its own challenge. Knowledge changes can be observed shortly after education, but community behavior change requires a longer process. Waste sorting habits must be practiced repeatedly to become part of daily routines. Similarly, operating the Rocket Stove requires a clear management mechanism so that the facility is not only used during the activity period but remains utilized after the student program ends.

Program sustainability is also heavily dependent on having designated parties responsible for operating and maintaining the facility. The Rocket Stove requires regular management, including scheduling usage, collecting residual waste, cleaning equipment components, and monitoring during the burning process. Without a clear management mechanism, the facility

may not be utilized optimally over the long term. Therefore, the RW leaders and local community need to agree on a simple management scheme suitable for community capabilities.

Based on these results and limitations, further activity development is recommended to focus not only on adding more Rocket Stove units, but also on establishing a waste management system that supports the utilization of the facility. Additional Rocket Stove sites may be considered if evaluation results indicate high community demand and adequate resources exist for constructing and maintaining additional units. Placing new units should account for residential density, distance between areas, community accessibility, site safety, and land availability.

Beyond expanding infrastructure, waste sorting education must be conducted continuously. A one-off socialisation session is insufficient to ensure long-term community behavior change. Education can be carried out periodically through neighborhood meetings, civic activities, housewives' groups, youth activities, or other environmental initiatives. Materials can be delivered simply and repeatedly using waste examples commonly found in daily life.

The educational approach can also be expanded through door-to-door methods. This approach enables direct information delivery to households that did not attend the socialisation events. Through home visits, environmental cadres can demonstrate waste sorting, explain residual waste collection mechanisms, and identify specific constraints faced by each household. This approach also helps reach residents living far from the Rocket Stove location.

Involving environmental cadres is also recommended as a strategy to maintain program sustainability. Cadres can be provided basic knowledge on waste sorting, facility operation, usage recording, and passing information to the community. Local cadres help reduce reliance on students or external parties, allowing waste management activities to be continued by the local community after the service program ends.

The RW leadership can also consider formulating a simple mechanism regarding Rocket Stove usage. This mechanism can include usage schedules, responsible parties, types of waste allowed, safety procedures, and facility maintenance protocols. Having simple rules will help ensure that the equipment is used consistently and in accordance with its original purpose.

To enhance program effectiveness, future activities can also include recording Rocket Stove usage. Records could track usage dates, volume or weight of waste processed, burn duration, number of usage sessions, types of waste processed, and tool condition after use. This data can serve as an objective evaluation baseline regarding facility capacity and utilization rates. With routine record-keeping, RW leaders can determine whether the facility is used optimally or requires adjustments in its management framework.

Further evaluation of community behavior change is also necessary. Assessment should not rely solely on immediate post-socialisation knowledge gains, but should continue through observations weeks or months after the activity. Observable indicators include waste sorting habits, facility usage frequency, household participation rates, and reductions in open burning practices. This medium-term evaluation will provide a clearer picture of the program's sustainable impact.

Overall, the Rocket Stove implementation and waste sorting education in RW 07, Lebakwangi Village, serve as an initial step in introducing a waste management approach that integrates appropriate technology with community capacity building. The Rocket Stove offers

an alternative facility for residual waste handling, while education provides the foundational knowledge for community members to sort waste at the source. Both components must operate side-by-side so technological deployment does not stand alone without the support of behavioral change.

Considering the limitations identified, this program cannot yet be categorized as a final solution for all waste issues in RW 07. However, the activity has established an initial foundation in the form of a pilot facility, enhanced knowledge, and practical experience for the community in implementing more targeted waste management. The next phase of program development should focus on expanding access, strengthening community institutions, ongoing education, usage record-keeping, and evaluating behavioral change.

With sustained support from RW leaders, residents, environmental cadres, village officials, and other relevant stakeholders, the implementation of waste management technology can be expanded incrementally. This development encompasses not only facility expansion, but also fostering community habits in sorting waste, reducing illegal dumping, and using processing facilities responsibly. Consequently, this community service initiative can serve as a starting point to build a more organized, participatory, and sustainable community waste management system in RW 07, Lebakwangi Village.

REFERENCES

- Butar, C. N. B., Al Ghifary, F. A., Nabil, M. W., Raharjo, R. D., Mustafiah, S. S., Maharani, A. C., Sefia, N., Pratiwi, E. J. A., Deviana, R., Agustina, H., Marlina, A., Rachman, M. A., & Wahyanto, W. (2025). Penerapan teknologi rocket stove sebagai solusi pengelolaan sampah ramah lingkungan di Desa Mergowati, Kecamatan Kedu, Kabupaten Temanggung. *Tintamas: Jurnal Pengabdian Indonesia Emas*, 2(3), 267–277. <https://doi.org/10.53088/tintamas.v2i3.2272>
- Fahmi Yahya, M., & Agustya Ningrum, D. (2023). Inovasi alat pembakaran sampah tanpa asap metode Rocket Stove. *AMONG: Jurnal Pengabdian Masyarakat*, 5(2), 42–49. <https://doi.org/10.51804/ajpm.v5i2.16395>
- Putri, N. W. N. S. T., Dewi, E. G. A., Filbert, E., Santosa, I. K. D. Y., Kajeng, T. K. T., Winata, K. W. T., & Putra, I. K. N. A. (2026). Edukasi pemilahan sampah berbasis media visual dan praktik di Sekolah Dasar Adhi Mekar Indonesia. *Dedikasi: Jurnal Pengabdian Kepada Masyarakat*, 6(2), 206–214. <https://doi.org/10.46368/dpkm.v6i2.5072>
- Rivai, A., Fausy, M., & Mulyadi, M. (2023). Penggunaan alat pembakaran sampah tanpa asap untuk mengatasi pencemaran lingkungan. *Sulolipu: Media Komunikasi Sivitas Akademika dan Masyarakat*, 23(1), 88–93. <https://doi.org/10.32382/sulo.v23i1.417>
- Syapranata, R., Rusydi, M., Fatiha, S., Agustin, D. D., Alfandi, S., Zulkifli, M., Jasmon, A. O., Aulyandra, F., Samsinar, & Arwanti, N. C. (2025). Rocket stove sebagai solusi alternatif pengelolaan sampah rumah tangga di Desa Batu Licin. *Nusantara: Jurnal Pengabdian Kepada Masyarakat*, 5(4), 187–197. <https://doi.org/10.55606/nusantara.v5i4.6811>
- Undang-Undang Republik Indonesia Nomor 18 Tahun 2008 tentang Pengelolaan Sampah.
- Yulianti, B., Haryanti, M., Dewanto, Y., Sukendar, T., & Pratama, R. B. (2025). Pemanfaatan Rocket Stove sebagai alat pembakar dan pengering sampah organik sebagai solusi

pengurangan sampah berkelanjutan. Jurnal Bakti Dirgantara, 2(2), 103–110.
<https://doi.org/10.35968/evq54p66>