Al-Jihad: Journal of Community Service
Vol. 2, No. 1 (2026), 142-149

# Public Perception and Adoption of EcoBurn Technology in Household Waste Management in Kedungsari Village, Lamongan

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**Keywords:**
*waste burning, EcoBurn, environmental health, eco-friendly technology, community perception*

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***Abstract:*** *Open waste burning remains a common practice in many rural areas of Indonesia, including Kedungasri Village, Kembangbahu Subdistrict, Lamongan Regency. This practice poses serious health and environmental risks due to air pollution, especially from toxic smoke produced by the combustion of organic and inorganic waste. This study aims to understand community perceptions of the dangers of waste burning smoke and to evaluate the implementation of the EcoBurn device as an environmentally friendly alternative for waste management. Using a descriptive qualitative approach and case study design, data were collected through semi-structured interviews, direct observation, and documentation of activities. The findings indicate an increase in community awareness following the EcoBurn socialization and demonstration activities, although adoption remains limited by economic constraints and entrenched habits. The study highlights the importance of participatory and educational approaches to drive behavioral change and the need for institutional support to ensure sustainable adoption of environmentally friendly technology at the village level.*

**Abstrak**

Pembakaran sampah terbuka masih menjadi praktik umum di banyak daerah pedesaan di Indonesia, termasuk Desa Kedungasri, Kecamatan Kembangbahu, Kabupaten Lamongan. Praktik ini menimbulkan risiko kesehatan dan lingkungan yang serius akibat polusi udara, terutama dari asap beracun yang dihasilkan oleh pembakaran sampah organik dan anorganik. Penelitian ini bertujuan untuk memahami persepsi masyarakat terhadap bahaya asap pembakaran sampah dan mengevaluasi penerapan perangkat EcoBurn sebagai alternatif ramah lingkungan untuk pengelolaan sampah. Dengan menggunakan pendekatan kualitatif deskriptif dan desain studi kasus, data dikumpulkan melalui wawancara semi-terstruktur, observasi langsung, dan dokumentasi kegiatan. Temuan menunjukkan peningkatan kesadaran masyarakat seselah kegiatan sosialisasi dan demonstrasi EcoBurn, meskipun adopsi masih terbatas oleh kendala ekonomi dan kebiasaan yang sudah mengakar. Penelitian ini menyoroti pentingnya pendekatan partisipatif dan edukatif untuk mendorong perubahan perilaku serta kebutuhan akan dukungan kelembagaan guna memastikan adopsi teknologi ramah lingkungan yang berkelanjutan di tingkat desa.
**Kata kunci**: Pembakaran sampah, EcoBurn, Kesehatan lingkungan, teknologi ramah lingkungan, persepsi masyarakat.

## INTRODUCTION

In Kedungasri Village, Kembangbahu Subdistrict, Lamongan Regency, Indonesia, trash is still disposed of in open dumps. Open burning is the primary method residents use to manage household waste because the centralized waste management system is inefficient and the community is unaware of the

environmental and health hazards posed by this method. In addition to polluting the air, poor waste management affects the soil. Non-biodegradable plastics and heavy metals contain toxic substances that can seep into the soil, disrupt the balance of the ecosystem, and poison animals and plants. However, several studies have shown that burning waste produces hazardous compounds such as carbon monoxide (CO), fine particulate matter (PM2.5), dioxins, and furans, which are carcinogenic and can worsen air quality.

The impact of air pollution caused by waste burning cannot be ignored. This is due to the significant link between the burning of household waste and an increase in asthma cases among children. According to other sources, people frequently exposed to smoke from burning have a higher risk of developing chronic respiratory disorders (5). This practice also causes social discomfort among neighbors and conflicts due to the spread of air pollution. Therefore, technology-based interventions and public education are crucial for creating a healthy and sustainable environment.

Students participating in the Community Service Program (KKN) at UIN Sunan Ampel Surabaya have developed an alternative waste incinerator called EcoBurn. This device aims to reduce harmful emissions by maximizing a more efficient and environmentally friendly closed-loop combustion process. The dangers of smoke emissions were also raised through live demonstrations of EcoBurn's use to the general public ( ). The goal is not only to enhance collective understanding but also to encourage more environmentally conscious lifestyles.

The objective of this study is to determine how the community views the effects of waste incineration and how effective the EcoBurn device is as an alternative. This study also examines how outreach and technology demonstrations influence residents' understanding and perceptions of safer and healthier waste management. This is conducted using a qualitative methodology. In terms of the Sustainable Development Goals (SDGs), specifically Goal 3 (Good Health and Well-being) and Goal 13 (Climate Action), this study is expected to provide theoretical and practical contributions to the development of community-based environmental education strategies.

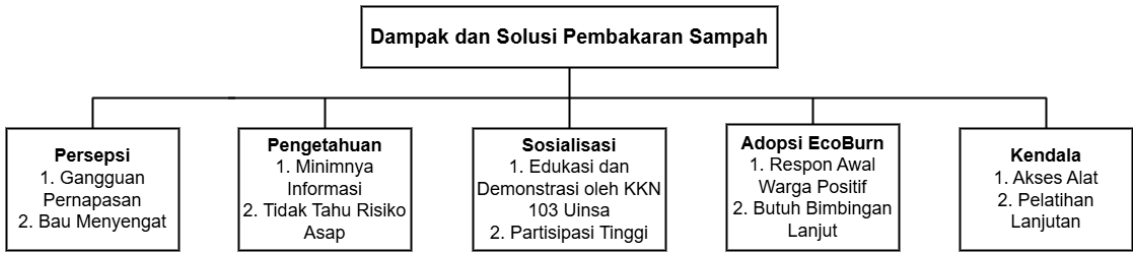
## RESEARCH METHODS

This study employs a descriptive qualitative approach using a case study design, aiming to gain an in-depth understanding of the implementation of the EcoBurn waste management tool and community perceptions regarding the hazards of smoke from waste burning in rural areas. The population in this study consists of residents of Kedungasri Village, Kembangbahu Subdistrict, Lamongan Regency, with a focus on village officials, members of the Karang Taruna youth organization, and residents who participated in the EcoBurn tool's outreach and demonstration activities. Sampling was conducted using purposive sampling, which

involves selecting informants deemed to possess knowledge, experience, or direct involvement in waste management activities and EcoBurn demonstrations. Data sources consisted of primary and secondary data. Primary data were obtained through semi-structured interviews and direct observation of outreach activities and the use of the EcoBurn device, while secondary data were obtained from activity documents, program implementation reports, and relevant literature. Data collection instruments included interview guidelines, observation notes, activity documentation, and audio recording devices. Interviews were conducted with at least five informants, comprising the Village Head, Karang Taruna members, and residents participating in the outreach sessions. Data analysis was performed using thematic analysis techniques through the stages of data reduction, data presentation, and drawing conclusions. Data validity was strengthened through source and technique triangulation, as well as *member checking* conducted in a structured manner following the interviews, by providing transcripts to informants to obtain confirmation of the accuracy of the content and meaning of the data.

## RESULTS AND DISCUSSION

This study aims to understand community perceptions and the implementation of the EcoBurn smokeless waste incinerator in Kedungasri Village, Kembangbahu Subdistrict, Lamongan Regency. The results show that the previous practice of burning waste was considered normal by the community. The village head acknowledged that before the Community Service Program (KKN) activities began, waste burning was carried out routinely without considering its impact. However, following awareness campaigns and demonstrations of the EcoBurn device's use by KKN students ( ), community awareness began to grow. The Youth Association (Karang Taruna) stated that they actually did not agree with the practice, but due to the lack of alternative waste management options, the community was forced to continue it. Residents also noted that they were accustomed to burning waste, but after attending the awareness sessions, they began to understand the health and environmental risks and are now considering stopping the practice.




***Picture 1:*** *Research Thematic Diagram*

From a health perspective, informants noted that the direct health impacts of smoke from burning are not yet well understood. The village head was unaware of the specific health effects of burning trash but observed that the environment had become unsanitary. The youth group complained that the smoke was quite bothersome, although no serious cases had been reported. After receiving educational outreach, some residents linked symptoms such as coughing and shortness of breath to the practice of burning trash. This aligns with previous studies indicating that exposure to smoke from burning trash can increase the risk of respiratory problems due to the presence of fine particulate matter (PM2.5) and toxic chemical compounds.

Public understanding of the link between waste burning and disease remains limited. The village head believes that the community does not yet fully understand the connection between smoke and disease, while the youth organization is aware of the dangers but feels that the education they have received is still insufficient. Residents stated that they were previously unaware of the dangers of smoke, but now they are beginning to understand that the practice poses a health risk. This finding aligns with previous research revealing a significant association between the practice of burning trash and an increase in asthma cases.

Waste management practices also indicate that most residents still burn or dispose of waste improperly. The village head noted that residents do not yet view waste management as a priority. The youth organization explained that the majority of residents dump waste in vacant lots because no designated disposal sites are available. Residents acknowledge that this practice is carried out due to limited resources. This phenomenon indicates low environmental awareness and a lack of systematic intervention. The lack of waste management facilities in rural areas is also one of the main causes of the high prevalence of burning.

Environmental awareness is also considered to be low. The village head stated that environmental issues have not yet become a primary concern for the community. The youth organization highlighted the lack of education from the village government, while residents feel that environmentally friendly waste management is important but lack sufficient knowledge and skills. These challenges indicate gaps in environmental education programs at the village level. Structural barriers such as the lack of a landfill, limited funding, and inadequate facilities hinder behavioral change. Conversely, the EcoBurn demonstration serves as a positive catalyst. The Youth Association believes this tool offers practical and applicable solutions, while residents find it highly effective in reducing smoke. The community's positive response to EcoBurn indicates that an eco-friendly technological approach can be well-received if supported by appropriate education. This finding is also consistent with several previous studies demonstrating the effectiveness of smokeless incineration devices as an alternative for managing household solid waste in areas without.

Summary **Table of** Research Findings

| No. | Thematic Topic | Key Findings | Informant | Quotes / Important Notes |
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| 1 | Perceptions of waste burning | Burning is considered normal, but this began to change after the community service program | Village Head, Residents | "It used to be uncontrolled, but since the KKN program, insha'Allah it can change" (Village Head) "It was common, but after the outreach, people started to think twice" (Resident) |
| 2 | Health impacts of trash burning | Smoke is considered bothersome and can potentially cause coughing and shortness of breath | Kartar, Resident | "The smoke is bothersome; sometimes it makes it hard to breathe—I only realized it after it was explained to me" (Resident) "The smoke is quite bothersome" (Kartar) |
| 3 | Understanding of the health hazards of smoke | Initial understanding was low but improved after the outreach | All informants | "I never thought about it before, but now I understand that it can cause asthma" (Resident) "It has always been considered normal by everyone" (Village Head) |
| 4 | Waste management practices | Waste is burned or disposed of indiscriminately; there is no waste management system | All informants | "It's collected and then burned indiscriminately; sometimes it's also dumped into the river" (Resident) "Most people still burn it" (Kartar) |
| 5 | Environmental awareness | Awareness is still low; it needs to be improved through education | Village Head, Kartar | "So far, the community hasn't taken this seriously" (Village Head) "There's no awareness yet due to a lack of education from the government" (Kartar) |
| 6 | Barriers and drivers of change | The lack of a disposal site and limited equipment are the main obstacles | Village Head, Kartar | "There is no funding to build a landfill" (Village Head) "There is no landfill, so people burn their waste individually" (Kartar) |
| 7 | Responses to the EcoBurn device | Positive response; residents are enthusiastic and want the equipment to be expanded | All informants | "The community will start to become aware of and pay attention to the issue of waste" (Village Head) "Personally, I strongly agree" (Kartar) "The device is very good; it can minimize the smoke emitted" (Resident) |
| 8 | Future hopes regarding waste management | Want a disposal site, training, and village-based management policies | Village Head, Kartar | "Village heads will be asked to make their own tools" (Village Head) "We hope there will be training on waste management and that a special site will be provided for the landfill" (Kartar) |

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| 9 | The role of the village government | There has been no concrete education from the village; the KKN program is the first experience | All informants | "There has never been any contact from the village government" (Village Head) "There is no education at all" (Kartar) "This is the first time I've received information about the dangers of burning" (Resident) |
| 10 | Effective intervention approaches | The approach involving equipment demonstrations and PKK women is considered the most effective | All informants | "It's easier through the women" (Village Head) "Hands-on demonstrations have a significant impact" (Kartar) "Through religious study sessions and direct examples, the message is easily accepted" (Resident) |

Residents' expectations regarding waste management have also grown stronger following the KKN intervention. The Village Head took the initiative to encourage hamlet heads to create similar tools on their own. The Youth Association proposed the allocation of a dedicated site and further training, while residents hope for an official government-managed landfill. The role of the village government has so far been limited; in fact, informants revealed that formal education regarding the dangers of burning trash was only obtained through the KKN activities. The Village Head suggested that educational efforts be directed through the PKK women's groups to be more effective. A hands-on approach based on demonstrations and concrete examples was deemed by the Youth Association and residents as the method most readily accepted by the community, as it directly addresses their daily experiences and life contexts. A participatory approach centered on direct outreach is better equipped to change community perceptions and habits in the short term.

These results generally indicate a shift in public perception and increased awareness of the dangers of burning trash, thanks to technology-based and community-based educational interventions. However, behavioral change still faces structural barriers and ingrained habits that are difficult to alter without policy support and village infrastructure. These findings suggest that behavioral change in waste management in villages requires collaboration between technology, education, and structural support, as outlined in the social ecology approach to environmental health.

## CONCLUSION

This study shows that open waste burning remains a common practice in Kedungasri Village and has negative impacts on health and the environment. Through the Community Service Program (KKN), which included outreach and demonstrations of the EcoBurn device, there was an increase in residents' awareness of the dangers of smoke from burning, as well as interest in more environmentally friendly alternative solutions. Residents who were directly involved in the activities

expressed positive perceptions of the EcoBurn, both in terms of combustion efficiency and its potential for household use, although further adaptation and ongoing support are still needed to ensure the sustainability of its implementation.

Further support from village governments and environmental stakeholders is needed to distribute EcoBurn devices more widely and provide ongoing training to the community. It is also recommended that such programs be replicated in other rural areas facing similar challenges, with adjustments to the local context and active community participation serving as the key to the successful adoption of alternative waste management technologies.

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