Abdimas Umtas: Jurnal Pengabdian Kepada Masyarakat
LPPM-Universitas Muhammadiyah Tasikmalaya
Volume: 9, Issue: 1, January, 2026; pp: 202-209
E-ISSN: 2614 - 8544

Implementation of Rocket Stove–Based Drying Technology to Improve Local Food Processing Productivity in Teniga Village

Indah Nalurita [1, a)], Husnita Komalasari [1], Irwan Cahyadi [2], Sukmawaty [3], Ida Bagus Ketut Widiartha [4]

[1]Faculty of Engineering, Bumigora University, Indonesia
[2]Faculty of Economics and Business, Bumigora University, Indonesia
[3]Faculty of Food Technology and Agroindustry, Mataram University, Indonesia
[4]Faculty of Engineering, Mataram University, Indonesia

[a)]Corresponding author: indah@universitasbumigora.ac.id

ABSTRACT

Teniga Village has abundant banana resources, and low market prices have encouraged the community to add value through food processing. The Kembang Pisang Group, established in 2021 with 20 members, is one of the leading community groups engaged in the production of pisang sale (dried bananas). Before the technological intervention, the drying process relied solely on traditional sun drying, which made it highly dependent on weather conditions, required 4-7 days, and often resulted in mould growth and inconsistent product quality. The community empowerment program, implemented to address these challenges, consisted of a situation analysis, socialization, training, and evaluation. The application of rocket-stove hybrid drying technology has had significant impacts. Before its implementation, the total production volume was only 15 kg; it increased to 40 kg, representing a 166% improvement. Reduced drying time and increased production volume are key indicators of successful productivity enhancement in local banana-based food products in Teniga Village.

ARTICLE INFO

Article History:
Submitted/Received: 06-11-2025
First Revised: 16 December 2025
Accepted: 25 December 2025
First Available online: 31 January 2026
Publication Date: 31 January 2026

Keyword :
Local Food Processing
Drying technology
Productivity
Rocket Stove
Community empoerment

https://doi.org/10.35568/abdimas.v9i1.7487

INTRODUCTION

Teniga Village in North Lombok Regency is classified as a disadvantaged area due to low human development index, limited infrastructure, and weak economic capacity (Pradana and Muin 2020). Nevertheless, the village has significant natural resources, with most residents relying on plantations for their livelihoods. The Village Medium-Term Development Plan (RPJMDes) 2023–2029 identifies banana cultivation, including the varieties kepok, raja, ambon, emas, and ulin, as the most abundant commodities in the area. Although bananas are available year-round, farmers typically sell them as fresh fruit at relatively low and unstable prices (approximately IDR 10,000–25,000 per bunch). This price instability adversely affects farmers' income and often fails to cover crop maintenance costs. Consequently, reliance on fresh fruit sales has hindered the optimal economic value of banana commodities.

Recognising the abundant banana supply and its low selling price, the local community collaborated to create alternative economic opportunities by forming small-scale processing groups. The Kembang Pisang Group, which specialises in the production of pisang sale, is one of the leading community enterprises. Established in 2021, the group consists of 20 members and processes 30–50 bunches of bananas per day.

However, the group faces a major challenge in the production process, specifically in drying. Traditional sun drying is highly weather-dependent; heavy rainfall in the region prolongs the drying period, causing mould development and inconsistent product quality (Rahman, Sukmawaty, and Sabani 2017). Sun drying also requires an extended duration, reducing efficiency and production capacity. Such methods increase the risk of quality degradation and contamination (Kariem and Maesaroh 2022). Previous empowerment initiatives have introduced various drying technologies to address similar issues in other regions (Alifatin, Andini, and Nurhayatin 2022; Fiveriati, Amalia, and Bachtiar 2020; Nurpulaela et al. 2023; Setiawan et al. 2024; Sukmawaty et al. 2019). Therefore, the implementation of appropriate drying technology is considered necessary to increase the productivity of local food processing in Teniga Village.

METHOD

Location, Time, and Participants

The team carried out this community service program in Teniga Village, Tanjung District, North Lombok Regency, West Nusa Tenggara. A total of 35 participants joined the program, including members of the Kembang Pisang Group, village government representatives, lecturers from Bumigora University, and facilitators from Mataram University.

Stages of Implementation

The empowerment program was designed to ensure that participants progressively acquired knowledge, skills, and hands-on experience. The implementation stages are presented in Figure 1.

https://doi.org/10.35568/abdimas.v9i1.7487

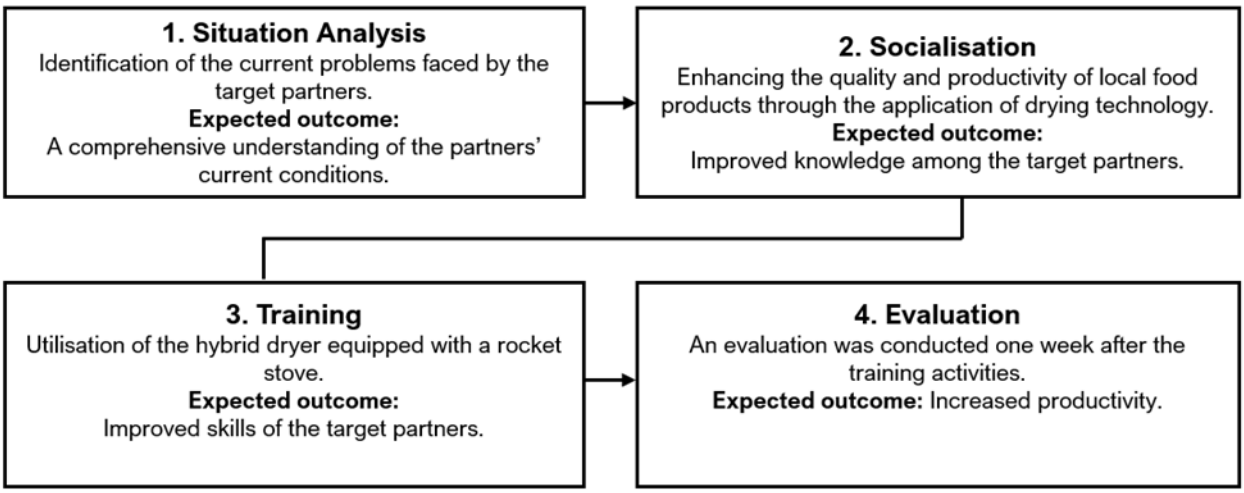

FIGURE 1. The implementation stages of the community service program

Situation Analysis

Conducted over seven days through observation, interviews, and discussions to identify the core problems faced by the partner group. Collected data served as the foundation for subsequent activities. Participants, the community support from the village government ensured program integration with local development plans.

Socialization

A socialization session was conducted, focusing on improving the quality and productivity of local food products through drying technology. The session included a presentation, discussions, accompanied by pre-tests and post-tests to assess changes in participants' knowledge.

Training

The team conducted a single training session to introduce and demonstrate the hybrid drying technology utilising a rocket stove. The training featured lectures, collaborative discussions, and hands-on practice. The team evaluated the success of this stage based on the availability of the equipment and the participants' ability to operate it independently.

Evaluation

The team conducted the evaluation one week after the training through field mentoring, direct observation, discussions, and feedback forms. They assessed productivity improvements based on reduced drying time and increased production volume. Evaluation was conducted using pre-test and post-test questionnaires, and the resulting data were analyzed statistically using a T-test.

https://doi.org/10.35568/abdimas.v9i1.7487

RESULTS AND DISCUSSION

Socialization

The empowerment activities commenced with a socialization session aimed at strengthening the participants' understanding of quality improvement and productivity enhancement in local food processing through the application of drying technology. The session employed a participatory approach, integrating presentations, guided discussions, and interactive dialogue to encourage active participation. In addition, pre-tests and post-tests were administered to assess changes in participants' knowledge, which served as a primary basis for evaluating the effectiveness and outcomes of the socialization stage.

FIGURE 2. The socialization session on improving the quality and productivity of local food products through drying technology

The socialisation stage aimed to enhance participants' understanding of drying technology. The success of the socialization stage was assessed by examining the increase in participants' knowledge regarding drying technology for local food processing. Understanding levels were measured using pre-test and post-test questionnaires. Analysis of the pre-tests and post-tests results showed that participants' knowledge of processing technology increased by 58%. Table 1 presents the detailed assessment results.

TABLE 1. Results of the independent T-test on participants' Kknowledge

No.	Question	Socialization Results	
		Pre-test	Post-test
1.	Do you know about drying?	60%	100%
2.	Do you know about technologies for drying local food products?	24%	88%
3.	Have you ever used drying technology?	24%	92%
4.	Are you able to operate drying technology?	28%	96%
5.	Do you know about rocket stove drying technology?	48%	100%
6.	Do you understand the benefits of applying drying technology?	40%	100%
Average		**38%**	**96%**
Increase		**58%**	

https://doi.org/10.35568/abdimas.v9i1.7487

Training on Hybrid Dryer with Rocket Stove

The hybrid dryer combines a portable solar dryer with biomass-fueled heating using rocket stove technology, an efficient and clean-burning stove design (Khan, Hossain, and Rahman 2016; Silva 2020). It employs two heat sources: solar energy and biomass (such as coconut shells, firewood waste, and agricultural residues) (Ayuningtyas and Aridito 2020). These heat sources accelerate the drying process and improve combustion efficiency by 30–40% (Comsawang, Nanetoe, and Soponpongpipat 2020).

FIGURE 3. The hybrid drying technology utilising a rocket stove

The hybrid drying technology with a rocket stove operates by placing food materials on the racks inside the drying chamber, where they are dried using a combination of solar heat and heat generated from the rocket stove. In this system, the rocket stove burns biomass such as coconut shells, rice-husk firewood, and dried agricultural residues to produce thermal energy. The generated heat is directed into the drying chamber to accelerate moisture removal, while the evaporated water is discharged through an exhaust chimney, ensuring an efficient and continuous drying process (Haile and Adem 2024).

FIGURE 4. Implementation of the hybrid drying technology utilising a rocket stove

The training on the use of the hybrid drying technology equipped with a rocket stove was implemented using a participatory approach that combined lectures, guided discussions, and hands-on practice. The lecture sessions provided foundational knowledge on the working principles of the hybrid drying system, the role of the rocket stove, and the benefits of its application in improving the efficiency and quality of pisang sale drying. During the discussion sessions, the implementation team, supporting

https://doi.org/10.35568/abdimas.v9i1.7487

team, and partner group actively reviewed the challenges they faced in previous drying practices and identified practical solutions that matched actual field conditions.

During the practical component, the implementation and supporting teams actively guided the process, starting with raw material preparation, operating the hybrid dryer with the rocket stove, adjusting drying temperature and duration, and evaluating the drying results. Members of the Kembang Pisang Group actively participated in each stage of the practical training. Their active involvement was intended to enhance technical skills, strengthen operational understanding of the equipment, and foster self-reliance in the sustainable application of the technology within their daily production activities.

Evaluation of Productivity Improvement

The implementation of hybrid drying technology with a rocket stove has significantly increased the productivity of the target partners. Productivity improvement was measured by increased production capacity and time efficiency during the drying process. Before the introduction of this technology, most processes were carried out manually and depended on weather conditions, resulting in low productivity and inconsistent product quality. After the technology was implemented, various aspects of production showed significant improvements in drying speed and production volume.

TABLE 2. Productivity improvement of target partners

Aspect	Before Technology	After Technology	Percentage Increase
Drying time	2-3 days	6-8 hours	80% time reduction
Production volume	15 kg	40 kg	166%

Following the implementation of the hybrid dryer with a rocket stove, there was a significant increase in the time efficiency of drying pisang sale. The hybrid system, which combines solar heat utilisation and biomass heating via the rocket stove, reduced the drying process from 2–3 days to only 6–8 hours. This represents approximately 80% time efficiency while also reducing dependency on weather conditions. With this technology, production can be conducted continuously and on schedule, unaffected by rainy or cloudy seasons, providing greater certainty in planning and executing production.

In addition to enhancing time efficiency, the hybrid drying technology with a rocket stove significantly increased the production volume of pisang sale. Before adopting the technology, the partners produced only 15 kg; after implementation, production increased to 40 kg, representing a 166% growth. The accelerated drying process and higher production volume clearly demonstrate the program's success in improving the productivity of local banana-based food products in Teniga Village.

FIGURE 5. Drying results using the hybrid dryer with the rocket stove

https://doi.org/10.35568/abdimas.v9i1.7487

The application of the hybrid dryer with a rocket stove as an additional heat source increased combustion efficiency by 30-40%, significantly accelerating the drying process of pisang sale. The optimised combustion system produces consistent heat, reduces fuel consumption, and facilitates a more hygienic drying process by operating in a closed, controlled environment (Silva 2020). This technology also reduces dependency on weather conditions, allowing production to proceed continuously with consistent temperatures (Mansyur and Apriani 2023). Thus, the use of rocket stove-based drying equipment serves as an effective solution to increase production capacity and sustainability while supporting the achievement of productivity improvement indicators for local food products.

CONCLUSION

The implementation of hybrid drying technology utilising a rocket stove markedly improved the productivity of banana-based food processing in Teniga Village, particularly within the Kembang Pisang Group. Before the intervention, production was constrained by weather conditions and low efficiency. After adopting the new technology, drying time decreased by approximately 80%, while production volume increased from 15 kg to 40 kg, a 166% improvement. These results provide strong evidence that hybrid drying technology is a highly effective and sustainable solution for boosting productivity and enhancing the resilience of local food processing enterprises.

ACKNOWLEDGMENTS

The authors express their gratitude to the Directorate of Research and Community Service (DPPM) for funding this community service initiative through the 2025 Societal Collaboration Program (KOSABANGSA) 2025.

REFERENCES

Alifatin, Aini, Thathit Manon Andini, and Nurhayatin Nurhayatin. 2022. “Peningkatan Daya Saing UMKM Rengginang Dengan Teknologi Pengeringan Menggunakan Mesin Kolektor Tenaga Surya.” JAST : Jurnal Aplikasi Sains dan Teknologi 5(2). doi:10.33366/jast.v5i2.2847.

Ayuningtyas, Endah, and M.Noviansyah Aridito. 2020. “Studi Karakteristikproses Pirolisis dan Arang Dari Briket Serbuk Kayu Dengan Variasi Laju Pemanasan Menggunakan Metode Pirolisis Single Rocket Stove.” Jurnal Rekayasa Lingkungan 19(1). doi:10.37412/jrl.v19i1.12.

Comsawang, Paisan, Suwat Nanetoe, and Nitipong Soponpongpipat. 2020. “Co-Firing of Sawdust and Liquid Petroleum Gas in the Application of a Modified Rocket Stove.” Processes 8(1). doi:10.3390/pr8010112.

Fiveriati, Anggra, Firda Rachma Amalia, and Riza Rahimi Bachtiar. 2020. “Teknologi Rotary Dryer Coffe Guna Meningkatkan Produktivitas Kopi Gombengsari Sebagai Produk Unggulan Central Perkebunan Masyarakat Kabupaten Banyuwangi.” E-Dimas: Jurnal Pengabdian kepada Masyarakat 11(3). doi:10.26877/e-dimas.v11i3.4656.

Haile, Tigist Elias, and Kamil Dino Adem. 2024. “Experimental Evaluation of Low-Cost Thermoelectric Integrated Rocket Stove.” Cleaner Energy Systems 7. doi:10.1016/j.cles.2024.100112.

https://doi.org/10.35568/abdimas.v9i1.7487

Kariem, Vickri El, and Imas Maesaroh. 2022. "Standarisasi Mutu Simplisia Jahe (Zingiber Officinale Roscoe) Dengan Pengeringan Sinar Matahari Dan Oven." Herbapharma : Journal of Herb Farmacological 4(1). doi:10.55093/herbapharma.v4i1.178.

Khan, S, T Hossain, and MM Rahman. 2016. "Development of Portable Rocket Stove and Performance Evaluation." International Research Journal of Engineering and Technology (IRJET) 3(12).

Mansyur, Syaiful, and Enda Apriani. 2023. "Analysis of the Effect of Temperature and Raw Material Mixes on the Pyrolysis Process with Single Retort-Rocket Stove Technology on the Characteristics of Sawdust Charcoal Briquettes." International Journal of Industrial Optimization. doi:10.12928/ijio.v4i1.6688.

Nurpulaela, Lela, Dian Budhi Santoso, Arnisa Stefanie, Reni Rahmadewi, Vita Efelina, and Jojo Sumarjo. 2023. "Pemberdayaan Masyarakat Tentang Pemanfaatan Teknologi Pengering Makanan Dengan Solar Cell Berbasis Digital Monitoring System Di Desa Cibuaya." Selaparang: Jurnal Pengabdian Masyarakat Berkemajuan 7(3). doi:10.31764/jpmb.v7i3.17217.

Pradana, Bryandika Eri, and Muhamad Fathul Muin. 2020. "Analisis Diskriminan Untuk Menentukan Status Ketertinggalan Desa Di Provinsi Jawa Tengah Tahun 2014." Jurnal Ekonomi, Bisnis, dan Akuntansi 21(4). doi:10.32424/jeba.v21i4.1546.

Rahman, Arief Fazlul, Sukmawaty, and Rahmat Sabani. 2017. "EVALUASI PENGERINGAN PISANG SALE (Musa Paradisiaca L.) PADA ALAT PENGERING HYBRID (SURYA-LISTRIK) TIPE RAK Evaluation on Sale Banana (Musa Paradisiaca L.) Drying on Hybrid (Solar-Electricity) Tray Dryer." Jurnal Ilmiah Rekayasa Pertanian dan Biosistem 5(1).

Setiawan, Jainnul, Novan Sandi Pradana, Ika Favia Anggraeni, Ardika Nurmawati, and Erwan Adi Saputro. 2024. "Pemberdayaan Kelompok Tani Tri Rejeki Melalui Pengenalan Teknologi Pengeringan Cabai." JATEKK 3(1). doi:10.33005/jatekk.v3i1.57.

Silva, Rafael Leal da. 2020. "Rocket Stove as a Proposal of Experimental Practice for the Teaching of Physics." Revista Científica Multidisciplinar Núcleo do Conhecimento. doi:10.32749/nucleodoconhecimento.com.br/fisica-en/rocket-stove.

Sukmawaty, Sukmawaty, Asih Priyati, Guyup Mahardhian Dwi Putra, Diah Ajeng Setiawati, and Sirajuddin Haji Abdullah. 2019. "Introduksi Alat Pengering Tipe Rak Berputar Sebagai Upaya Mempercepat Proses Pengeringan Hasil Petanian." JMM (Jurnal Masyarakat Mandiri) 3(1). doi:10.31764/jmm.v3i1.921.

https://doi.org/10.35568/abdimas.v9i1.7487