

ADVANCING LOCAL EMPOWERMENT IN KAMPUNG INDONESIA, NONTHABURI, THAILAND THROUGH IN VALORIZATION OF USED COOKING OIL INTO FLOOR CLEANING SOLUTIONS

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ABSTRACT This community service program was conducted in Kampung Indonesia, Nonthaburi, Thailand, a diaspora community with active household and small-scale culinary activities that generate a considerable amount of used cooking oil. Field observations and daily consumption estimates indicate that this waste oil has not been utilized optimally; instead, it is often reused excessively or disposed of directly into the environment, posing potential health risks and environmental pollution. The main issues identified include limited public awareness of the hazards associated with repeated use of used cooking oil and a lack of knowledge and skills to convert it into value-added products. Therefore, this program aimed to enhance community awareness and capacity to process used cooking oil into safe and economically valuable floor cleaning products. The methods applied included educational sessions on the properties and impacts of used cooking oil, introduction to the required tools and materials, and hands-on training covering step-by-step processing techniques. The results demonstrated a significant improvement in participants' understanding and practical skills, as well as strong enthusiasm to independently produce the cleaning product. In conclusion, this initiative effectively empowered the community by transforming household waste into useful products, while also contributing to environmental sustainability and local economic development

KEYWORDS: *Used Cooking Oil, Floor Cleaning Solutions, Community Empowerment.*

1. INTRODUCTION

Used cooking oil is a common waste generated from households and culinary businesses, and its volume continues to increase along with the high consumption of cooking oil, including in Thailand, a country known for its rapidly growing tourism and food sectors. Quantitative data

indicate that Thailand produces a substantial amount of used cooking oil each year. In 2019, vegetable oil consumption reached approximately 2.4×10^9 kg, which was estimated to generate around 7.8×10^8 kg of used cooking oil annually. However, only about $1.8\text{--}5.8 \times 10^8$ kg of this waste oil is effectively collected and valorized (Thushary & Babel, 2022). In addition, national statistics reported that used cooking oil generation increased from around 74 million liters in 2017 to approximately 115 million liters per year in 2022, reflecting a significant upward trend (Nation Thailand, 2022). Despite this large volume, a considerable portion of used cooking oil is still not managed properly.

At the community level, used cooking oil is often reused excessively or disposed of directly into the environment without proper treatment, posing potential risks to human health and causing soil and water pollution. In fact, used cooking oil has considerable potential to be converted into value-added products such as biodiesel, soap, and floor cleaning liquids that are more environmentally friendly and economically beneficial.

The utilization of used cooking oil as a raw material for floor cleaning products is one of the most practical alternatives at the household level due to its relatively simple processing method and the availability of supporting materials. Several previous studies have demonstrated that used cooking oil can be processed through saponification or specific formulations into cleaning products with satisfactory effectiveness (Hidayati et al., 2019; Widyastuti & Sari, 2020; Rahmawati et al., 2021; Haryani et al., 2025; Haryani et al., 2026). In addition, training-based activities have been shown to improve community knowledge and skills in sustainable waste management. Previous studies conducted by Haryani et al. have further highlighted the practical application of used cooking oil processing into value-added products, including its transformation into cleaning agents and its implementation within community-based empowerment programs (Haryani et al., 2025; Haryani et al., 2026a; Haryani et al., 2026b).

However, most of these studies are still limited to laboratory-scale research or have not been optimally integrated into community empowerment programs, particularly within diaspora communities abroad. This gap highlights the need for an approach that combines research outcomes with direct implementation in society. In this context, the community service program conducted in Kampung Indonesia, Nonthaburi, Thailand, becomes highly relevant. This program is not only based on the actual needs of the community but also builds upon prior research and community service conducted by the authors, as reported in previous publications focusing on waste oil utilization, community training, and applied product development (Haryani et al., 2025; Haryani et al., 2026; Haryani et al., 2026a; Haryani et al., 2026b).

Therefore, this initiative is expected to bridge the gap between research and real-world

application, while making a meaningful contribution to enhancing community awareness, practical skills, and economic independence through the utilization of used cooking oil into valuable and sustainable floor cleaning products.

2. METHOD

This community service program was implemented in Kampung Indonesia, Nonthaburi, Thailand, a diaspora community characterized by active household and small-scale culinary activities that generate a considerable amount of used cooking oil. The program was conducted in April 2026 over a four-day period and involved approximately 50 participants, including housewives, small business owners, and community members as the primary beneficiaries.

The methodological approach was designed to be participatory and application-oriented in order to address the limited utilization of used cooking oil and the lack of public awareness regarding its environmental and health impacts. The implementation consisted of several stages: (1) preliminary assessment through field observation and informal discussions to identify existing practices and challenges, (2) educational sessions covering the properties of used cooking oil, its potential applications, and the risks associated with repeated use and improper disposal, (3) technical training on the tools and materials required for processing, and (4) guided demonstration followed by hands-on practice in producing floor cleaning liquid from used cooking oil.

The processing procedure adopted in this program was based on previously developed methods reported by Haryani et al. (2025; 2026), with necessary adaptations to suit local conditions and material availability. The main steps included filtration of used cooking oil, simple purification to remove impurities and reduce odor, and formulation with additional agents such as surfactants and fragrances to produce an effective and user-friendly floor cleaning solution. This approach is consistent with prior studies indicating that used cooking oil can be successfully transformed into cleaning products through relatively simple saponification and formulation techniques (Hidayati et al., 2019; Widyastuti & Sari, 2020; Rahmawati et al., 2021).

Furthermore, a hands-on training model was employed to enhance participants' comprehension and practical skills, as it has been shown to be effective in community-based technology transfer initiatives (Haryani et al., 2026a; 2026b). The evaluation of the program was conducted through participatory observation, interactive discussions, and direct feedback from participants to assess knowledge improvement and skill acquisition.

Through this structured and practice-based approach, the program is expected to not only deliver conceptual understanding but also equip the community with applicable skills to independently convert used cooking oil into valuable and sustainable floor cleaning products.

3. RESULT AND DISCUSSION

International Community Service (PKM) VIII was held by LSM Sharing, the Indonesian Academic Community, in Kampung Indonesia, Nanthaburi, Thailand, on April 18-21 in a hybrid manner. This activity was held in collaboration with various universities in Indonesia and international partners (the Special Branch of Muhammadiyah Thailand and the Chulalongkorn Indonesian Student Association). Participants who attended the event were the community in the village and students and teachers of Thammimislam School. The 8th International PKM activities included programs on education and health services as well as economic empowerment of the local community. Information about the activity, including the time and place of implementation, implementation methods, series of activities, activity outputs, and the community service organizers, was conveyed in advance through pamphlets as shown in Figure 1.



Figure 1. Pamphlet of the VIII International PKM in the Indonesian Village, Nonthaburi, Thailand

3.1. The Preparation Stage

The preparation phase was carried out by the Student Creativity Program (PKM) team from the Department of Chemical Engineering, Faculty of Engineering, Universitas Sriwijaya, Indonesia. The team, consisting of a project leader and several members, organized and designed the initial framework for the community service activity. During this stage, the team developed educational materials in English, including a poster and a video, to explain the process of converting used cooking oil into a floor cleaning solution. The use of English aimed to ensure that the materials could be easily understood in an international setting.

The poster was designed as a supporting visual tool to enhance the delivery of the presentation. It provided a clear and concise summary of the background of the program, the potential

value of recycling used cooking oil, and the step-by-step procedure for producing the cleaning fluid. In addition, it included a brief overview of the activity to give the audience a comprehensive understanding of the project. The poster is presented in Figure 2 below.

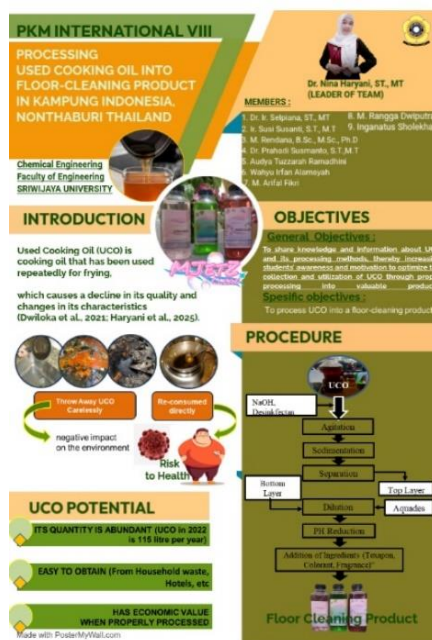


Figure 2. Poster on the Processing of Used Cooking Oil into Floor Cleaning Fluid at the 7th International PKM, Kampung Indonesia, Nonthaburi, Thailand.

3.2 Implementation Stage

On the day of the VIII International Student Creativity Program (PKM), all participants and presenters were required to sign an attendance list as formal documentation of their participation. This activity marked the official commencement of the program and ensured proper recording of both online and offline attendees. The event brought together presenters from a wide range of universities across Indonesia, reflecting strong academic collaboration and engagement.

These institutions included Universitas Sriwijaya, Universitas Malikussaleh, Universitas Sebelas Maret Surakarta, Universitas Jambi, Universitas Katolik Indonesia Atma Jaya, Universitas Muhammadiyah Tangerang, Universitas Slamet Riyadi Surakarta, Universitas Wisnuwardana Malang, Universitas Bosowa Makassar, Universitas Indraprasta PGRI, Universitas Kristen Indonesia, Universitas Veteran Bangun Nusantara, Sekolah Tinggi Ilmu Ekonomi Pasundan, Sekolah Tinggi Ilmu Ekonomi Malang, Universitas Darussalam Ambon, Institut Agama Islam Minhaajurrosyidin Jakarta, Universitas Putra Indonesia, and several other institutions.

The participation of these universities, both in person and virtually, contributed to a dynamic and interactive academic environment. It also highlighted the collaborative spirit of the program in

promoting knowledge exchange and community service initiatives at an international level. Documentation of the participants present during the activity is shown in Figure 3.



Figure 3. Participants and presenters of the VIII International PKM: (a) offline session at Thamimislam School; (b) online session conducted via Zoom.

The activity was carried out by the team through a hybrid presentation delivered to all participants. The organizing committee provided adequate facilities for each PKM team to present their respective materials effectively. Participants showed a high level of enthusiasm and interest throughout the session. They paid close attention to the explanation, particularly the process of transforming used cooking oil into a valuable product. An engaging and interactive discussion followed, running smoothly and reflecting the participants' active involvement and eagerness to take part in the program. Documentation of the activity during the session is presented in the figure below:

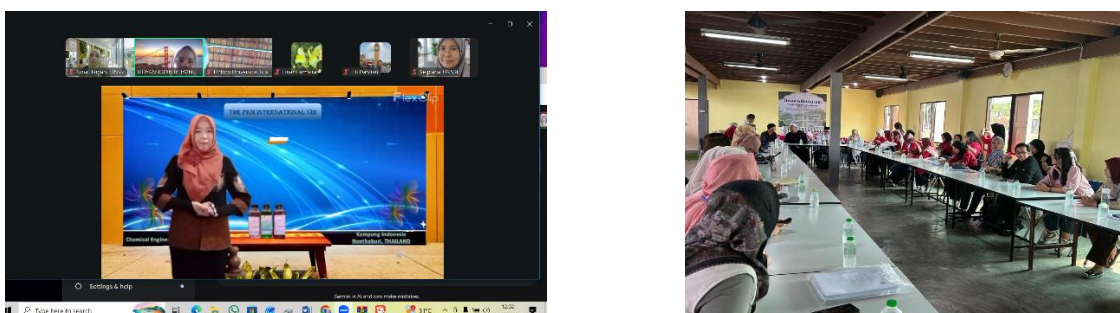


Figure 4. Presentation of PKM materials via Zoom: (a) Presenter from Universitas Sriwijaya; (b) Participants.

This activity is expected to broaden participants' knowledge and encourage them to explore the potential of used cooking oil as a valuable resource. By doing so, it can contribute to improving community welfare, public health, and environmental sustainability, especially considering that the potential of used cooking oil in Thailand has not yet been fully utilized. In addition, understanding how to process used cooking oil and package the resulting products in an appealing way can open up business opportunities for participants. This not only enables them to generate additional income but also supports the growth of the local economy.

4. CONCLUSION

The VIII International Student Creativity Program (PKM) achieved its primary objectives of delivering knowledge and raising awareness about the utilization of used cooking oil as a value-added product. The high level of participant engagement, active discussions, and clear understanding of the material indicate that the targeted outcomes namely knowledge transfer and skill introduction were successfully met.

The methods applied in this community empowerment activity, particularly the use of a hybrid approach combined with visual and English-based educational materials, were well aligned with the needs and challenges of the target community. Considering the significant yet underutilized potential of used cooking oil in Thailand, the chosen approach effectively addressed both environmental concerns and the need for practical, accessible solutions that participants can adopt.

In terms of impact, the activity provided meaningful benefits by increasing participants' awareness of environmental sustainability, enhancing their practical knowledge of waste processing, and opening opportunities for small-scale entrepreneurship. These outcomes have the potential to contribute to improved community welfare, public health, and local economic development.

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CONFLICT OF INTERESTS

The authors confirm that there are no conflicts of interest related to this study. There are no financial, professional, or personal relationships that could have influenced the research process or the outcomes presented in this article. This work was conducted independently without support from any commercial or external funding bodies. No external party was involved in the study design, data

collection, analysis, manuscript preparation, or the decision to submit the article for publication. In addition, the authors declare that they have no affiliation with the journal's editorial board and are not connected to any organization that could benefit from the publication of this research.

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