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Training on the utilization of purun straw dryer in Tumbang Nusa Village, Pulang Pisau Regency

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ABSTRACT

Tumbang Nusa Village, located in Central Kalimantan, has natural resources in the form of purun plants, which can be utilized as raw materials for environmentally friendly products, one of which is purun straw. However, the traditional drying process produces inconsistent product quality and low productivity. This community service program aims to empower the Nusa Sehati Joint Business Group (KUB) by introducing appropriate technology as a purun straw dryer. The program consists of several stages, including problem identification, community service preparation, socialization, demonstration, and evaluation of the purun straw dryer's usage. The activity resulted in a significant increase in both production efficiency and product quality. The drying time, which initially took 3-4 days, was reduced to just 40 minutes, and the quality of the purun straws became more consistent, with each straw losing 22 percent of its mass during drying. Evaluation results from pre-test and post-test assessments revealed a significant increase in participants' understanding. Before the training, 80 percent of participants were aware of this technology, but only 53 percent had used it. After the training, 93 percent of participants stated that the technology was effective, and 100 percent reported improvements in the quality of purun straws. These results demonstrate the program's success in enhancing knowledge and productivity.

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1. INTRODUCTION

The Nusa Sehati Joint Business Group (KUB), based in Tumbang Nusa Village, Jabiren Raya Sub-district, Pulang Pisau District, Central Kalimantan Province, is a community group specializing in purun-based handicrafts. Purun, a type of grass native to peatlands, is abundant in this region and holds great potential for economic development. Among the three types of purun—rat purun, lake purun, and bajang purun—lake purun has proven particularly suitable for crafting eco-friendly products such as baskets, mats, and straws (Lestari et al., 2021; Fitriah & Malinda, 2022; Pitri, 2024; Susanto et al., 2024). One standout product is the purun straw, which has gained recognition as an environmentally friendly alternative to plastic straws, aligning with the global shift toward reducing single-use plastics

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(Rakhmawati et al., 2023). However, despite this potential, the traditional production methods used by KUB Nusa Sehati present significant challenges to efficiency and quality.

Figure 1. Purun product gallery of Nusa Sehati KUB

The Nusa Sehati Joint Business Group (KUB) has produced purun straws using traditional methods. However, the drying process for these straws remains manual, relying solely on sunlight. This method demands extensive land and labor, with workers constantly being present for supervision, leading to inefficiencies (Aisyah et al., 2020; Fachri et al., 2024). The long drying times, difficulties in maintaining product quality, poor hygiene, and high processing costs result in lower selling prices (Septiyana et al., 2019). Additionally, the unpredictability of sunlight-dependent drying methods often leads to suboptimal outcomes (Mindarta et al., 2023). For instance, drying purun can take over three days during cloudy or rainy weather, negatively impacting the community's income stability. Moreover, mechanical dryer products achieve superior color quality than those dried with solar heat (Abryandoko et al., 2024; Nursyafitri & Tanggasari, 2022). Additionally, manual sun-drying increases the risk of contamination, compromises the visual appeal and durability of the straws, and raises overall production costs (Ropiudin et al., 2024). As a result, the selling price of the straws remains low, limiting the income of the craftsmens. The inefficiencies in the drying process thus hinder KUB Nusa Sehati from fully capitalizing on the growing demand for eco-friendly products.

Research findings have highlighted that mechanical drying offers significant advantages over traditional sun drying (Rakhmawati et al., 2023). Studies by Nursyafitri & Tanggasari (2022) demonstrate that mechanical drying reduces drying time and ensures consistent color quality, enhanced durability, and improved hygiene in products. This aligns with the challenges faced by KUB Nusa Sehati, as adopting such technology could address their issues and increase both production efficiency and product value. Furthermore, findings from Aisyah et al. (2020) emphasize that inefficient manual drying methods in similar contexts often result in high labor costs and unstable production rates, reinforcing the necessity of introducing appropriate technological solutions.

Based on the explanation above, this training program seeks to provide comprehensive knowledge about purun straw drying technology that is efficient, simple, and quick to implement. Additionally, it aims to empower the women of the Nusa Sehati joint business group (KUB) by enabling them to utilize the purun straw dryer. The dryer is equipped with a temperature controller, and the heat source is an LPG gas stove, simplifying its operation and accelerating the drying process (Setiawan et al., 2022). This technology not only enhances the efficiency of the production process but also improves the quality of the purun straws, making them stronger and more durable. By utilizing this drying method, the business group can increase its production capacity, meet growing market demand, and create economic opportunities for the local community.

Numerous studies support the adoption of this dryer technology, highlighting its relevance and potential benefits for small-scale producers. Research by Setiawan et al. (2022) and Mindarta et al. (2023) emphasizes that appropriate technology innovations tailored to local contexts are crucial to empowering community-based businesses. Additionally, the initiative aligns with the principles of the green economy, promoting sustainable natural resource management and reducing environmental impact. These efforts are consistent with government initiatives to foster environmentally friendly industries and create new economic opportunities for rural communities.

This community service program aims to empower KUB Nusa Sehati by providing training and technical support for operating and maintaining the purun straw dryer. The program seeks to enhance the group's production efficiency, improve product quality, and foster economic growth within the Tumbang Nusa Village community. Ultimately, this initiative aspires to strengthen the village's position as a leader in eco-friendly handicrafts, contribute to the welfare of local craftsmens, and demonstrate the transformative potential of sustainable technology in rural development.

2. METHODS

This community empowerment program uses an approach that involves providing counseling and training on using the purun straw dryer in Tumbang Nusa Village, Pulang Pisau Regency (Figure 2). The village is 35.5 km from Universitas Palangka Raya, which takes approximately 47 minutes. This initiative includes several key stages: problem identification, preparation for community service, socialization, a practical demonstration of using the purun straw dryer, and an evaluation of the program's effectiveness (Figure 3).

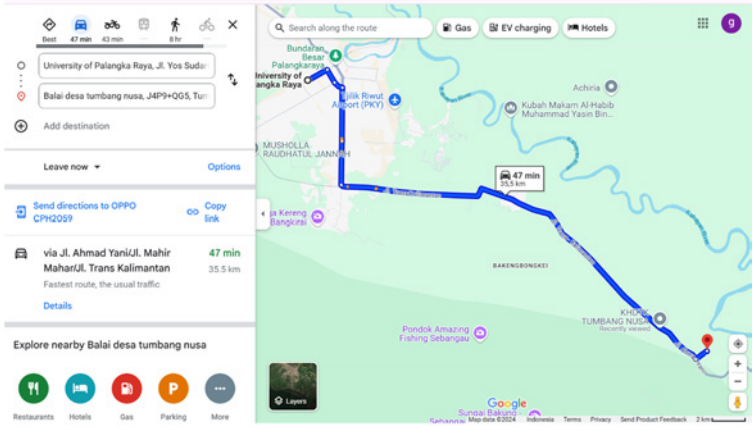

Figure 2. The distance between Tumbang Nusa Village and Universitas Palangka Raya

Problems Identification

The problem identification phase was carried out to examine the critical challenges faced by the Nusa Sehati Joint Business Group (KUB), particularly in processing purun straw products (Fatah et al., 2022). This process involved in-depth discussions with a representative from the Nusa Sehati KUB to understand the issues they were encountering. The discussions took place in March 2024, providing a crucial opportunity to gather relevant and insightful information. These conversations were instrumental in pinpointing the specific problems that needed to be addressed to enhance the overall production process.

Community Service Preparation

Preparations for the community service program took place between July and August 2024. These preparations included trials on the use of the purun straw dryer and the optimization of drying temperatures. The temperature optimization was conducted at a lab scale in the Chemistry Laboratory of Universitas Palangka Raya. Once the lab-scale tests were completed, drying trials using the actual dryer were carried out. Additionally, preparations for the tool handover, socialization, and demonstrations were made before the community service activities began.

Socialization

This community service initiative promotes appropriate technology by introducing purun straw dryers to the Nusa Sehati Joint Business Group (KUB) in Tumbang Nusa Village. The activities involved presenting relevant materials and interacting with the local community (Shabrina et al., 2024). The primary goal was to demonstrate the benefits of the purun straw dryer and explain its practical application in the production process. The socialization was conducted in the first week of September 2024.

Demonstration

The community service initiative aimed at empowering local partnerships by applying appropriate technology, such as purun straw dryers, was effectively implemented using a structured demonstration approach. This approach involved active participation from the Nusa Sehati Joint Business Group (KUB) in Tumbang Nusa Village. A live demonstration of the dryer's operation occurred at the KUB site, where members observed the entire process—from installing the equipment to adjusting the temperature settings and determining the optimal drying time for purun straw. During the demonstration, a skilled instructor provided comprehensive guidance on properly using and maintaining the equipment. Following this, participants engaged in a hands-on simulation, allowing them to operate the dryer independently. This practical experience helped the KUB members become more familiar with the equipment, facilitating integration into their daily activities. The demonstrations were conducted alongside socialization and evaluation activities to ensure the program's effectiveness.

Program's Evaluation

Participant evaluation was carried out by distributing pre-test and post-test questionnaires to assess participants' understanding of purun straw dryer products. The pre-test was administered before the training began to gauge participants' initial knowledge of the topic (Lusi et al., 2022). After the training and counseling sessions on purun straw dryer products were completed, participants were given a post-test to measure any changes in their knowledge and understanding. By comparing the results of the pre-test and post-test, the effectiveness of the training can be analyzed, and the extent to which participants can apply the information obtained when utilizing a purun straw dryer.

3. RESULTS AND DISCUSSION

Results

The results of the community service program carried out at KUB Nusa Sehati are discussed in several subsections. The first subsection discusses problem identification conducted together with the

purun craftsmen. The second subsection describes the preparations made in the context of community service, especially the things that need to be prepared for the smooth running of the event. After the preparation stage, the socialization of activities at KUB Nusa Sehati was carried out, followed by a demonstration of the use of the purun straw dryer. The program ended with an evaluation using a questionnaire to measure the level of understanding of the training participants.

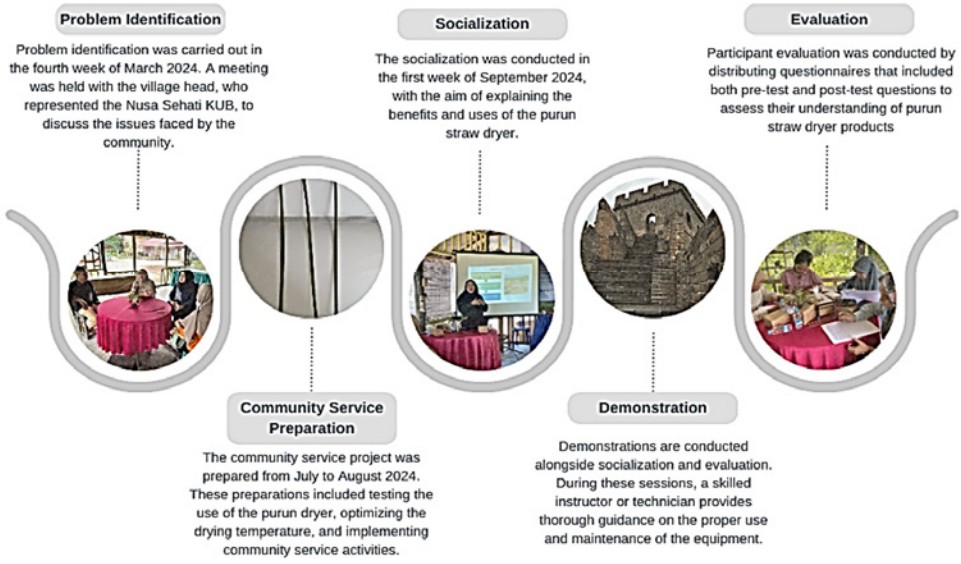

Figure 3. Timeline of community service implementation at Nusa Sehati KUB

Identification the problems

The problem identification conducted in March 2024 aimed to understand the challenges faced by the Nusa Sehati Joint Business Group (KUB). This process was carried out in-depth through direct observation and interviews with purun craftsmens in the village. The timing of the identification exercise was carefully chosen to coincide with a period that would provide representative data on the conditions and activities of the purun craftsmens. It also gave a clearer understanding of the factors influencing their productivity levels.

Discussions with the village head played a crucial role in this process (Figure 4). Through in-depth conversations with the village head, who serves as the representative of KUB Nusa Sehati, several critical issues faced by the group were revealed. The village head shared valuable insights into purun craftsmens' challenges, including issues related to natural resources, production equipment, and marketing. Additionally, these discussions helped identify untapped potential that could be leveraged to improve productivity.

As a result of these discussions, several significant issues impacting the productivity of Nusa Sehati's purun craftsmens became evident. One significant issue was the use of sunlight for drying purun straws, a process that takes 3-4 days and often leads to inconsistent results that do not meet buyers' expectations. The drying process also causes uneven color and raises hygiene concerns, as it occurs in the open air. Identifying this problem was crucial in designing targeted solutions to enhance the quality and quantity of purun products produced by KUB Nusa Sehati.

Figure 4. Discussion on the main problems in Nusa Sehati KUB

Community service preparation

Preparation for the community service program began with a trial phase for using the purun straw dryer. This trial aimed to ensure that the equipment functions effectively and efficiently in the purun straw drying. The primary focus at this stage was to verify that the craftsmens would use the dryer was working correctly and ready for use. Conducting this trial was crucial, as a well-executed drying process directly impacts the quality of the final product produced by the craftsmen.

Following the initial trial, the next step involved optimizing the temperature for drying purun straws. Experiments were conducted to determine the most suitable drying parameters, such as the ideal temperature and drying duration. Identifying the optimal temperature was essential because a too high temperature could damage the purun. At the same time, one that is too low would prolong the drying time and decrease production efficiency. Through this optimization process, the drying time could be reduced without compromising the quality of the purun straw materials. The optimum temperature was found to be 60°C for 40 minutes (Figure 5). During this process, the weight of the straw decreased by 22 percent, indicating a reduction in water content.

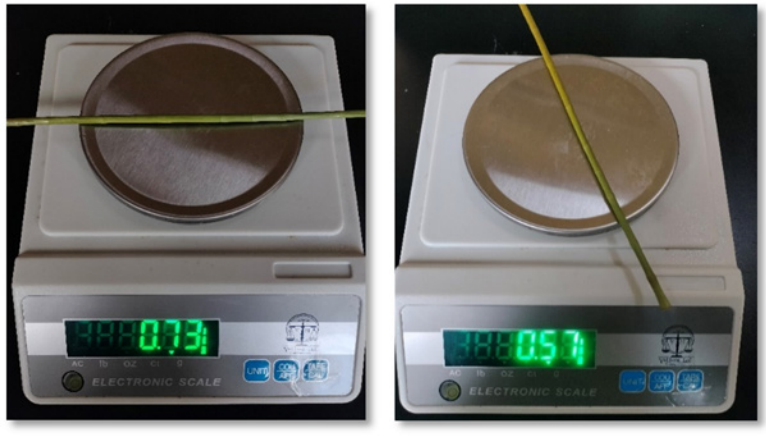

Figure 5. Mass reduction of purun straws (a) before (b) after 40 minutes of heating at 60 ◦C

The optimum test results at the laboratory scale were then applied using the purun straw dryer set to the selected temperature and drying time. This trial was conducted in the field to ensure that the device could be effectively used on a larger scale and meet the needs of the craftsmen. The field trial

also provided an opportunity to assess whether further adjustments were necessary before the device was handed over to the community. The findings from this trial were crucial in confirming the device's practicality and effectiveness for widespread use.

Socialization

The socialization session focused on helping participants master the operating techniques of the purun straw dryer, aiming to ensure that the partners could use the equipment effectively and efficiently. Various tools were provided to support the training's success, including pocketbooks, visual aids, stationery, and laptops. The pocketbook was an additional resource to help participants understand the purun straw dryer, from general knowledge to specific operating procedures. Meanwhile, the laptop and visual aids facilitated clearer and more in-depth explanations through digital presentations. All these tools were carefully designed to enhance participants' comprehension, enabling them to absorb the information more effectively and be well-prepared for practical implementation.

During the socialization stage, the speaker provided an overview of the purun plant's content, properties, and growing period. Additionally, the essential functions of the dryer were explained to the participants (Figure 6). After outlining the dryer's purpose and benefits, the session moved on to a detailed explanation of the dryer components and how to operate them properly. The team also offered guidance on the proper steps for drying purun straws using a simpler, less contaminating method. This practical, environmentally friendly drying technique aims to help participants produce higher-quality purun while promoting environmental sustainability and improving their economic well-being.

Figure 6. Socialization of the use of purun straw dryer

Demonstration

At the demonstration stage, participants were invited to practice using the purun dryer under the guidance of the team. The purpose of the demonstration was to enable participants to operate the purun straw drying machine independently. During this session, they were instructed to operate the dryer at various temperature settings to understand the optimal conditions for its use. Each participant had the opportunity to test different temperatures, allowing them to experience first-hand how temperature variations impacted the drying results (Figure 7). After several rounds of hands-on engagement, a pocket guide was provided as a reference manual to help participants remember the procedures and techniques taught during the session. The training concluded at 12:15 PM, followed by a lunch break until 12:45 PM.

Following lunch, the session resumed with presentations on storage techniques, maintenance, and safety protocols for using the dryer. Emphasis on these aspects was essential to ensure that the

equipment is used safely and effectively and can be maintained for long-term use. The team provided detailed instructions on how to store the dryer properly, maintain it for optimal performance, and follow safety measures during use. Additionally, the presentation covered how to ensure the drying process runs smoothly without the risk of damage or accidents.

Figure 7. The practical demonstration of purun straw dryer usage

Progam evaluation

The training participants were evaluated by distributing questionnaires containing pre-test and post-test questions to assess their understanding of the purun dryer technology. The pre-test was administered before the training began to gauge the participants' initial knowledge of the technology. The results revealed that 80 percent of participants were already familiar with purun dryer technology and its benefits. However, despite this knowledge, only 53 percent had used the technology, and a majority (87 percent) still relied on traditional sun-drying methods. This highlights the gap between theoretical knowledge and the practical application of purun dryer technology in the target communities. The pre-test data is presented in Figure 8.

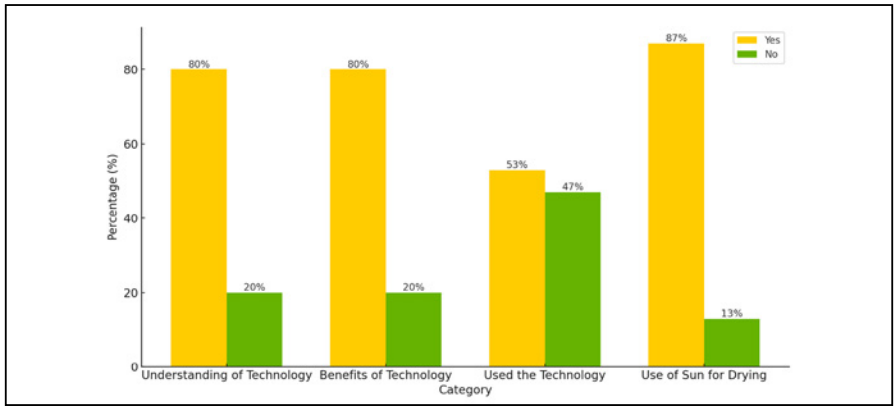

Figure 8. Graph of pre-test results of the effectiveness of using purun straw dryer

After the training, participants completed a post-test designed to assess their understanding of the material covered and measure any knowledge changes (Shabrina et al., 2024). The post-test results showed a significant improvement, with 93 percent of participants now considering the purun straw dryer effective (Figure 9). This represents a marked increase compared to the pre-test results, indicating that the training successfully enhanced participants' understanding of the technology. The improvement

underscores the effectiveness of the training in providing clear, practical information on the benefits and proper use of purun straw dryer.

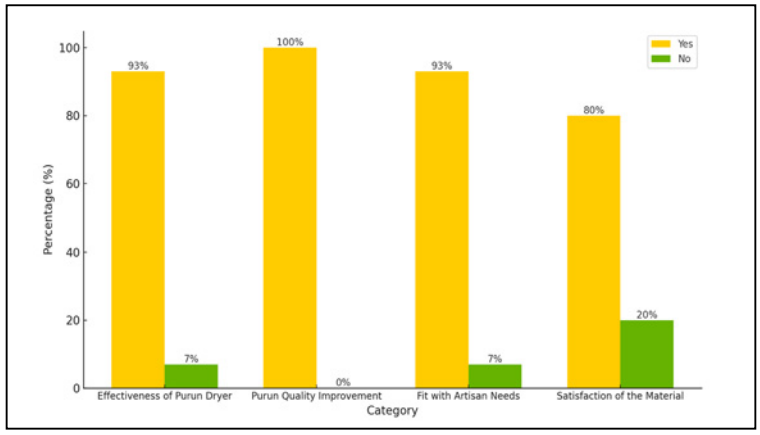

Figure 9. Graph of post-test results of the effectiveness of using purun straw dryer

Furthermore, the post-test results indicated that 100 percent of participants reported improving the quality of purun straws after using the dryer. This demonstrates that the training enhanced theoretical knowledge and had a tangible, positive impact on practice, with participants directly benefiting from the technology. With the improved quality of purun straws, it is expected that the products made by purun craftsmen will become more valuable and competitive in the market. In addition, the post-test results revealed that most participants (93 percent) felt the features of the purun straw dryer introduced during the training were well-suited to their needs. This result indicates that the equipment demonstrated in the training met the expectations and practical requirements of the purun craftsmen. Furthermore, participant satisfaction with the training materials was also very high, with 80 percent rating the materials as excellent. These results suggest that the training successfully transferred knowledge and provided appropriate technological solutions that align with the actual conditions and needs of the purun craftsmen. Through this training, participants gained new insights and could apply the technology to enhance both the quality and efficiency of their production.

Discussion

The training on using purun straw dryers for the artisans of KUB Nusa Sehati is part of a community service initiative to enhance the quality and efficiency of purun craftsmanship. KUB Nusa Sehati holds significant potential as a purun straw producer, with high consumer demand, vast production areas, and an established market reach, including international export (Adiyanto et al., 2020). This activity primarily aims to introduce technology that optimizes the drying process of purun straws, which was traditionally done using sunlight (Iswanjono et al., 2023). While the traditional drying process is simple, cost-effective, and uses unlimited solar energy, it is time-consuming, labor-intensive, and compromises the hygiene of the straws due to exposure to dust and other contaminants (Sinaga et al., 2020; Purwadi et al., 2020).

The training has had a positive impact on the purun craftment. The use of the dryer resulted in a uniform drying level, reducing moisture content by around 22 percent. With the application of this technology, the production process has become more efficient, reducing contamination and improving the quality of the final product, thereby enabling broader marketability. The training covered the operational use of the purun straw dryer and introduced key concepts of efficiency and time management

in production. The main benefit to the participants in Tumbang Nusa Village is the significant increase in drying efficiency. Previously, purun drying took several days, but now, with the dryer, it can be completed in just 40 minutes, with a capacity of up to 2000 straws per operation. This purun straw dyer has led to enhanced productivity, higher-quality products, and increased income for the craftment. Additionally, the dryer reduces dependence on weather conditions, which previously posed a significant production constraint (Alifatin et al., 2021).

The training also introduced the concept of innovation, which holds potential for the growth of the Nusa Sehati KUB in Tumbang Nusa Village. In the long term, the improved quality and efficiency of purun production could open up new market opportunities, both locally and regionally. Furthermore, the training provided hands-on experience with sustainable technology, inspiring the community to continue innovating and improving product quality. This initiative significantly contributed to science and technology (S&T) development by introducing a previously unknown technology to the purun craftment. The purun straw dryer, as appropriate technology, offers opportunities for future developments, such as customizing the equipment to better suit local needs and enhancing energy efficiency. For instance, using energy-efficient, environmentally friendly dryers could improve product quality without adding substantial costs. Notably, 93 percent of participants acknowledged the effectiveness of this drying method, and 100 percent were satisfied with the purun straw dryer. Overall, the training demonstrated positive changes, both technically and in fostering innovations that stimulate economic growth in the village. This initiative is hoped to serve as a model for other villages to adopt similar technologies and harness their local potential.

4. CONCLUSION AND RECOMMENDATIONS

The community service program conducted at KUB Nusa Sehati successfully achieved its primary objective of enhancing the knowledge and skills of purun craftsmen in using purun straw dryer technology. Before the training, only 53 percent of participants had ever used a dryer, with most still relying on the traditional sun-drying method. However, 93 percent of participants found the drying technology effective after the training, and 100 percent reported improving the quality of the purun straws produced. Pre-test and post-test evaluations significantly improved participants' understanding, with 93 percent indicating that the dyer's features met their needs. Additionally, the training addressed the issues of low productivity and poor product quality, offering practical solutions through more efficient and higher-quality drying. Overall, the program increased participants' knowledge and impacted the quality and efficiency of production at KUB Nusa Sehati.

Although this service program enhanced the knowledge of purun craftsmen, several limitations need to be addressed for further development. One fundamental limitation is the restricted duration of the training, which calls for ongoing mentoring sessions to help craftsmen master the effective use of purun dryers. Additionally, the training should address potential technical issues that may arise when using the equipment. Since the dryer will be housed exclusively within the KUB, it is recommended that service providers assist in developing a clear and structured system for the equipment's use and maintenance, ensuring that all group members can use it optimally. By doing so, the long-term impact of this program can be made more sustainable.

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