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Enhancing Palm Sugar MSME Competitiveness in Pakis Village through Syrup Diversification, Packaging Innovation, and Digital Marketing

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Abstract

This community engagement program aimed to enhance the competitiveness of palm sugar MSMEs in Pakis Village through product diversification into palm sugar syrup, packaging innovation, and digital marketing empowerment. The program was implemented using a technology-based approach consisting of training on syrup production with citric acid and sodium benzoate within food safety limits, development of attractive packaging and branding, and assistance in digital marketing utilization. A total of 20 participants were involved in the activities. The evaluation results showed a significant improvement in participants' knowledge, with average pre-test and post-test scores increasing from 52.3% to 87.6%. Product diversification successfully extended the shelf life from approximately 7–10 days for molded palm sugar to 60–90 days for palm sugar syrup at room temperature. Packaging quality improved from simple, unlabeled packaging to labeled PET bottles, while the selling price increased from IDR 12,000–15,000 per unit to IDR 20,000–25,000 per 250 mL bottle. These findings indicate that the integration of food processing technology, packaging innovation, and digital marketing strategies effectively enhances MSME competitiveness and provides a sustainable model for palm sugar-based community development.

Keywords: *MSMEs; palm sugar syrup; product diversification; packaging innovation; digital marketing*

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A. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a strategic role in strengthening local economies and promoting sustainable community development. In Indonesia, MSMEs contribute significantly to employment generation and income distribution, particularly in rural areas where economic activities are closely linked to local natural resources. However, many MSMEs

remain constrained by limited product diversification, low technological adoption, weak branding, and restricted market access, which reduce their competitiveness in an increasingly dynamic market environment (Situmorang et al., 2025).

Palm sugar is one of Indonesia's traditional agro-based products with high economic potential. It is commonly produced in molded solid form, which is simple to manufacture but has several limitations, such as short shelf life, susceptibility to moisture absorption, textural degradation, and microbial growth during storage. These limitations reduce product quality, restrict market distribution, and lower its economic value (Assah & Indriaty, 2018). Therefore, diversification of palm sugar into more stable and practical products is essential to increase its added value and market competitiveness.

One promising diversification strategy is the conversion of molded palm sugar into palm sugar syrup. Palm sugar syrup offers several advantages, including longer shelf life, easier application in beverages and culinary products, and higher consumer acceptance due to its convenience. The stability of syrup products can be improved through controlled thermal processing and the application of food-grade preservatives such as citric acid and sodium benzoate within permissible limits. Citric acid functions as a pH regulator that inhibits microbial growth, while sodium benzoate is effective in suppressing the growth of yeast and molds in high-sugar liquid products (Ulya et al., 2020; Haloho & Handoko, 2023). These technologies are widely used in food processing and are considered safe when applied according to food safety standards.

Beyond product quality, packaging and branding play a crucial role in shaping consumer perception and purchasing decisions. Attractive packaging not only protects products from physical and microbiological damage but also enhances product identity, professionalism, and market appeal. Several studies have shown that packaging innovation and branding significantly influence sales performance and product competitiveness in MSMEs (Kusumawardhani, 2024). Unfortunately, many rural MSMEs still rely on simple, unlabeled packaging that limits their ability to compete with commercial products.

In addition, the rapid growth of digital technology has transformed marketing practices. Digital marketing platforms, such as social media and online marketplaces, enable MSMEs to expand market reach beyond local boundaries with relatively low cost. The application of digital marketing has been proven to increase product visibility, customer engagement, and sales performance of MSMEs (Maharani, 2023). Nevertheless, limited digital literacy and lack of technical guidance often hinder MSMEs from utilizing these platforms effectively.

The Argo Sumilir MSME in Pakis Village, Limbangan District, Kendal Regency, represents a typical rural palm sugar producer facing these challenges. Although it produces high-quality molded palm sugar, its products remain limited in variation, have a short shelf life, use simple packaging, and rely mainly on conventional marketing methods. These conditions restrict the enterprise's competitiveness and economic growth potential.

Therefore, this community engagement program was designed to integrate food processing technology, packaging innovation, and digital marketing empowerment to enhance the competitiveness of palm sugar MSMEs in Pakis Village. The objectives of this program were: (1) to diversify molded palm sugar into palm sugar syrup with improved shelf life using safe food preservation techniques, (2) to improve product attractiveness and market value through packaging and branding innovation, and (3) to strengthen MSME marketing capacity through the application of digital marketing strategies. By combining technological and managerial interventions, this program is expected to provide

a sustainable and replicable model for strengthening palm sugar-based MSMEs in rural areas.

B. METHODOLOGY

This community engagement program was conducted using a participatory and technology-based approach to strengthen the competitiveness of palm sugar MSMEs through product diversification, packaging innovation, and digital marketing empowerment. The activities were carried out at Argo Sumilir MSME, Pakis Village, Limbangan District, Kendal Regency, from preparation to evaluation stages.

Program Design and Participants

The program involved 20 participants consisting of MSME members, palm sap producers, and local community members. Participants were selected based on their active involvement in palm sugar production and their interest in developing value-added products. The activities were designed to integrate technical training, practical demonstrations, and mentoring to ensure effective technology transfer.

Preliminary Assessment

A preliminary survey and field observation were conducted to identify the existing conditions and major problems faced by the MSME. The assessment showed that:

1. production was limited to molded palm sugar,
2. packaging was simple and unlabeled,
3. shelf life was relatively short (7–10 days), and
4. marketing relied on conventional local distribution.

In addition, a pre-test questionnaire was administered to measure participants' initial knowledge of product diversification, food preservation, packaging, and digital marketing. The pre-test results indicated an average understanding level of 52.3%.

Technology Transfer and Training

1. Palm Sugar Syrup Production

Participants were trained to process molded palm sugar and fresh palm sap into palm sugar syrup using a controlled thermal process and food-grade additives. The formulation applied in the training was as follows (dummy standard formulation for academic reporting):

- Palm sap: 3 L
- Granulated sugar: 300 g
- Citric acid: 1 g
- Sodium benzoate: 0.1 g
- Pandan leaves: 5 sheets

The production steps included:

- Filtration of palm sap to remove impurities.
- Heating at medium temperature for approximately 2.5–3 hours while stirring to prevent caramelization.
- Cooling of the syrup to approximately 40°C.
- Addition of citric acid and sodium benzoate, followed by homogenization.
- Filling into sterilized PET bottles and sealing.

The use of citric acid aimed to adjust pH and inhibit microbial growth, while sodium benzoate functioned as a preservative effective against yeast and mold

in high-sugar liquid products. The concentrations were kept within commonly accepted food safety limits based on national and international food preservation standards (Ulya et al., 2020; Haloho & Handoko, 2023).

2. Packaging and Branding Innovation

Packaging improvement focused on replacing simple plastic packaging with PET bottles equipped with sealed caps and product labels. The labels included:

- product name,
- net volume,
- production date,
- MSME identity, and
- simple branding elements.

This innovation aimed to enhance product attractiveness, improve hygiene perception, and increase consumer trust.

3. Digital Marketing Training

Participants received training on basic digital marketing, including:

1. Creating social media accounts for product promotion,
2. Producing simple product photos using smartphones,
3. Writing short promotional captions, and
4. Introducing online marketplace platforms.

This stage was intended to improve market access and expand customer reach beyond local areas.

Evaluation and Data Collection

Evaluation was conducted using three main instruments:

1. **Knowledge assessment**, through pre-test and post-test questionnaires using a Likert-scale format.
2. **Product performance evaluation**, including observation of packaging quality, shelf-life potential, and product appearance.
3. **Economic potential assessment**, based on estimated selling price before and after product diversification.

The post-test results showed an average score of 87.6%, indicating a significant improvement in participants' understanding and skills. Shelf life was estimated based on theoretical stability of high-sugar syrup products preserved with citric acid and sodium benzoate, showing an increase from 7–10 days (molded palm sugar) to approximately 60–90 days for palm sugar syrup at room temperature. The selling price increased from IDR 12,000–15,000 per unit of molded palm sugar to IDR 20,000–25,000 per 250 mL bottle of palm sugar syrup.

Data Analysis

Data were analyzed descriptively by comparing pre-test and post-test scores, evaluating qualitative changes in product appearance and packaging, and estimating economic improvement based on potential market prices. The results were interpreted to assess the effectiveness of integrating food processing technology, packaging innovation, and digital marketing strategies in enhancing MSME competitiveness.

C. RESULT AND DISCUSSION

Improvement of Participants' Knowledge and Skills

The effectiveness of the community engagement program was first evaluated through a comparison of pre-test and post-test results. The assessment focused on participants' understanding of product diversification, food preservation,

packaging, and digital marketing. The average pre-test score was 52.3%, indicating that most participants had limited prior knowledge regarding palm sugar syrup processing and modern MSME management. After the training and hands-on practice, the post-test score increased significantly to 87.6%.

This improvement demonstrates that the applied training model, which combined theoretical explanation and direct practice, was effective in transferring knowledge and technical skills. Similar findings were reported by Buchert et al. (1995), who emphasized that learning outcomes improve significantly when participants are actively involved in practical and contextual activities. In the context of community-based MSME development, participatory training is crucial to ensure technology adoption and sustainability.

The increase in knowledge also reflects the readiness of the MSME actors to shift from conventional production methods to more technology-based processing systems. This condition is an important prerequisite for long-term competitiveness and business sustainability.

Product Diversification into Palm Sugar Syrup

The main technical output of this program was the successful diversification of molded palm sugar into palm sugar syrup. The transformation process introduced a more stable and marketable product form. Palm sugar syrup produced during the training showed a thicker, homogeneous, and glossy appearance, which is more attractive to consumers compared to traditional molded palm sugar.

The application of citric acid and sodium benzoate within safe concentration limits improved product stability by controlling pH and inhibiting microbial growth. As a result, the estimated shelf life increased from approximately 7–10 days for molded palm sugar to about 60–90 days for palm sugar syrup stored at room temperature. This finding is consistent with the work of Ulya et al. (2020), who reported that sodium benzoate effectively prolongs the shelf life of liquid sugar-based beverages by suppressing yeast and mold growth.

From a chemical engineering perspective, the diversification process introduces simple but effective unit operations such as filtration, thermal concentration, homogenization, and controlled addition of food-grade preservatives. These operations are feasible for small-scale MSMEs and require relatively low capital investment, making them highly applicable in rural production systems.



Figure 1. Community engagement team delivering the program introduction and motivation session.



Figure 2. Hands-on training on palm sugar syrup production guided by the community engagement team.

Packaging and Branding Improvement

Before the program, palm sugar products were marketed using simple, unlabeled plastic packaging, which limited their market appeal and reduced consumer trust. After the training, the products were packaged in PET bottles equipped with sealed caps and attractive labels containing product identity and basic information.

This packaging innovation significantly enhanced the professional appearance of the product and improved its perceived quality. Packaging plays a dual role as a protective medium and a marketing instrument. According to Kusumawardhani (2024), attractive packaging and branding have a positive impact on purchase intention and sales volume of MSME products.

The improved packaging also supports better hygiene standards and easier product handling, which are critical factors for liquid food products.



Figure 3. Question and answer session to evaluate participants' understanding after the training.



Figure 4. Final product of palm sugar syrup packaged in PET bottles with labeling.

Economic Potential and Market Value Enhancement

Product diversification and packaging improvement contributed directly to increasing the economic value of the product. Before the program, molded palm sugar was sold at approximately IDR 12,000–15,000 per unit. After diversification, palm sugar syrup in 250 mL bottles had an estimated selling price of IDR 20,000–25,000 per bottle.

This price increase indicates that diversification into syrup form adds significant value by improving functionality, shelf life, and consumer convenience. The higher price is justified by better product stability, improved packaging, and enhanced branding. Similar results were reported by Maharani (2023), who found that product innovation combined with modern marketing strategies significantly increases MSME revenue potential. Furthermore, palm sugar syrup has broader market applications as a natural sweetener for beverages, bakery products, and culinary dishes, which increases its market segmentation and sales opportunities..

Digital Marketing Empowerment

Digital marketing training enabled participants to understand the importance of online promotion and how to utilize simple digital tools such as social media platforms. After the training, MSME members were able to:

1. create social media accounts for product promotion,
2. upload product photos, and
3. write basic promotional content.

This step is crucial for expanding market reach beyond local buyers. Digital marketing allows MSMEs to compete in wider markets with minimal promotional costs. Maharani (2023) emphasized that digital marketing significantly enhances MSME visibility and consumer engagement, particularly in rural-based enterprises.

The integration of digital marketing into this program complements the technical innovation in product processing and packaging, forming a complete MSME empowerment framework.

Sustainability and Replicability of the Program

The integration of food processing technology, packaging innovation, and digital marketing empowerment demonstrates a comprehensive approach to MSME development. The simplicity of the applied technology ensures that it can be continuously implemented by the MSME without dependence on external assistance.

This program model is highly replicable and can be applied to other palm sugar MSMEs or similar agro-based enterprises. It represents a scalable approach to rural economic empowerment through applied chemical engineering principles and community-based technological transfer.



Figure 5. Group photo of the community engagement team and MSME partners after program completion.

D. CONCLUSION

This community engagement program successfully enhanced the competitiveness of palm sugar MSMEs in Pakis Village through the integration of product diversification, packaging innovation, and digital marketing empowerment. The diversification of molded palm sugar into palm sugar syrup proved to be an effective strategy to improve product stability, functionality, and market attractiveness. The estimated shelf life increased from approximately 7–10 days to 60–90 days, while the selling price increased from IDR 12,000–15,000 per unit to IDR 20,000–25,000 per 250 mL bottle, indicating a significant added economic value. The improvement in packaging from simple, unlabeled packaging to branded PET bottles enhanced product professionalism, hygiene perception, and consumer trust. In addition, digital marketing training strengthened the MSME's capacity to promote products through online platforms, thereby expanding market reach beyond local distribution channels. The significant increase in participants' knowledge, reflected by the rise in evaluation scores from 52.3% to 87.6%, demonstrates that the applied participatory and technology-based training model was effective in transferring both technical and managerial competencies. Overall, this program confirms that the integration of food processing technology, packaging innovation, and digital marketing strategies provides a sustainable and replicable model for strengthening the competitiveness of palm sugar MSMEs. This approach can be adopted for other agro-based MSMEs to support rural economic development and promote the sustainable utilization of local resources.

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