
Training on local food diversification as an effort to improve the competitiveness of fish abon small and medium enterprises

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Abstract: Food MSMEs based on local resources face competitiveness challenges due to limited product innovation, process standardization, and quality control. Diversification of processed fish products using local commodities is a strategic approach to increasing value added, expanding market reach, and strengthening business sustainability. This community service program aimed to enhance the capacity of the Abon Ikan Inang MSME through training on processed fish product diversification. The program was conducted in July 2025 and involved 15 participants, using a participatory training approach based on andragogy principles. Activities were implemented in three stages, preparation, implementation, and evaluation. The intervention included training on product diversification and food safety, demonstrations of fish nugget and vegetable fish ball production, application of simple production standard operating procedures (SOPs), and evaluation through pre-test and post-test knowledge assessments as well as an initial organoleptic product acceptance test. The results showed an improvement in participants' knowledge, with most participants reaching the good knowledge category after the training. The program produced two new processed fish products, fish nuggets and vegetable fish balls, developed based on concise production SOPs. Initial organoleptic evaluation indicated good acceptance in terms of color, aroma, taste, and mouthfeel, although improvements were still needed for texture and portion uniformity. The integration of diversification training, process standardization, and simple sensory evaluation effectively strengthened MSME capacity in product development, quality control, and business differentiation. This approach reinforces the role of local resource-based diversification as a strategy to enhance MSME competitiveness and expand market access.

Keywords: Product diversification, Local food, Organoleptic test, MSMEs

Introduction

Development is defined as an effort to bring progress to society in order to improve its standard of living. Good development needs to make society the center and beneficiary of growth. One of the pillars that needs to be considered in building the nation's economy is Micro, Small and Medium Enterprises (MSMEs). MSMEs play a major role in growing and improving the economy (Ismail et al., 2023). These businesses are important for the welfare of the community because they are able to survive in any situation (Al Farisi & Fasa, 2022).

Food MSMEs are one type of MSME in Indonesia and play a strategic role in the regional economy because, in addition to absorbing labor, they also drive the local economy and provide access to affordable food (Daulay et al., 2024). However, amid increasingly fierce market competition due to changing consumer preferences, the penetration of large-scale manufactured products, and the dynamics of digital platforms, many food MSMEs still focus on conventional products with limited differentiation (Sirait, 2025). This condition has resulted in low competitiveness, thin margins, short product life cycles, and vulnerability to being displaced by substitute goods.

Data from the East Nusa Tenggara Statistics Agency (BPS NTT) for 2024 shows that fishery production in this province is quite abundant, with a recorded marine fishery production of 139,067 tons (BPS NTT, 2024). This opens up opportunities for the diversification of value-added products.

Diversification based on local raw materials has the potential to create products and added value with distinctive regional flavors. In addition to providing economic incentives for the local supply chain, in this case fishermen and processors, this strategy is also in line with efforts to achieve food security, reduce dependence on imported materials, and achieve sustainable development goals (Puspitasari et al., 2023).

The main challenges for MSMEs in taking advantage of these opportunities are low product innovation capacity, inconsistent food quality and safety standards, packaging and labeling designs that lack information and do not meet nutritional/composition information requirements, licensing and regulatory compliance, unstructured branding and digital marketing, and economic aspects that are often not measurable (Simangunsong, 2022). This capacity gap hinders MSMEs from enhancing their competitiveness and often limits them to price-based competition.

Local food diversification training is designed as an integrated capacity building intervention, covering the development of food products based on local commodities, the implementation of food safety practices, packaging design, including appropriate nutritional claims and information, as well as simple marketing and accounting strategies to ensure business viability (Ikhrum & Chotimah, 2022). The training approach emphasizes practical learning (hands-on) and brief mentoring so that skills can be immediately implemented in production and sales lines (Nurjannah et al., 2025). Diversification training is a good strategy for improving knowledge and skills, which is in line with the findings of Marta and Tensiska, that food diversification training can improve the skills of the participants (Marta, 2013). Thus, MSMEs that receive training and mentoring are expected to be able to produce more diverse products that are of consistent quality, have a strong local identity, and are competitive in both offline and digital markets.

The urgency of this activity is even greater due to changes in consumer behavior that prioritize quality, safety, and sustainability. Product diversification by utilizing local food commodities allows for differentiation through taste and product identity, as well as cost efficiency by utilizing local supplies (Anam & Kurniati, 2025). Training interventions are relevant because they not only improve product quality but also strengthen the MSME business model, open up wider market access, and improve the welfare of business actors and their ecosystem.

Inang Fish Floss MSME is one of the food MSMEs engaged in the processing of fishery products into fish floss. The fish processing production process is currently limited to producing fish floss in two variants: original and spicy. However, there is still potential to process fish into other new products, given that the market potential for fish-based derivative products remains open and has not been fully utilized. Therefore, one of the efforts that can be undertaken is to provide training on diversifying local fish products into new products.

Based on these conditions, this community service activity will be positioned to bridge the capacity gap of MSMEs through structured short-term training and mentoring for MSMEs. This is intended so that the trained and mentored MSMEs not only gain increased knowledge, particularly in creating new products, but also become capable of producing new processed fish products such as fish balls and fish nuggets as a result of diversification without compromising food quality and safety. With these achievements, it is hoped that the competitiveness of the Inang Fish Abon MSME as a local food business will increase.

Method

The implementation of this community service activity uses a participatory training approach based on andragogy, which is a learning method that treats adult participants as individuals who have different experiences, needs, and learning motivations than children. Therefore, the training strategy is designed as much as possible to encourage active involvement, be experience-based, and focus on solving the problems faced (Arifin & SE, 2025).

Community service activities (PKM) were carried out by a team of lecturers from Nusa Cendana University. The target of this activity was Abon Ikan Inang, a micro, small and medium enterprise (MSME) in the processed food sector. The improvement of knowledge and skills in making processed fish products was carried out by first providing information about the opportunities and potential for product diversification, followed by a demonstration/simulation of making fish nuggets and vegetable fish balls as new products. This activity was then followed by an organoleptic test conducted by a panel of culinary experts, who provided comprehensive assessments and feedback. The results of the organoleptic test were used to evaluate the characteristics and acceptability of the products. For further clarification, this activity is divided into three stages, namely the preparation stage, implementation stage, and evaluation stage. These stages can be detailed as follows:

1. Preparation Stage

At this stage, the PKM team first conducted preliminary observations and approached the parties involved in the planned activities. This was done to ensure the partners' willingness to participate in the activities. The PKM team then prepares the tools and materials needed for the activity, namely materials on the diversification of processed food products and their potential, then coordinates with partners regarding the raw materials to be used in the demo/simulation process, explanations of standard operating procedures (SOP) for product production and personal hygiene in the context of food safety practices. This is intended so that partners will be able to maintain the quality and safety of food products. Additionally, the team prepared forms for organoleptic testing to assess the acceptability of the products.

2. Implementation Stage

The activity began with a presentation on food product diversification and market potential, food safety practices in accordance with production SOPs, followed by a demonstration/simulation of fish nugget and fish ball with vegetables production. Partners not only provided demonstration equipment but were also asked to be directly involved in the product demonstration activity. The finished fish nugget and fish ball with vegetables products were tested organoleptically. This test is part of a sensory evaluation conducted to assess product characteristics (color, aroma, taste, texture, and mouthfeel). This test is carried out to evaluate product characteristics and assess product acceptance. The results will later be used as notes in product development and quality control.

3. Activity Evaluation

This stage is necessary to assess the entire series of activities that have been carried out. At this stage, the team found that there was an increase in understanding of the importance of product diversification and the willingness of partners to make other products besides the fish floss products that already existed. In addition, the results of the organoleptic test conducted by the panelists showed the acceptability of the products.

Results and Discussion

This community service activity was carried out in July 2025. The participants of this activity are MSME partners engaged in the processed food sector, totaling 15 participants.. The training was conducted in three stages: preparation, implementation, and evaluation. The activities carried out included the delivery of material to improve participants' understanding of product diversification and its potential, as well as demonstrations/simulations of fish nugget and fish ball production. Product diversification for SMEs is part of a strategy to add new types or variations of products beyond existing ones, with the aim of increasing sales and profitability, expanding market reach, reducing reliance on a single product, and enhancing competitiveness.



Figure 1. Presentation of materials on food diversification and its potential

At the beginning of the activity, participants were given material on the importance of food diversification and its potential. Participants were quite enthusiastic in receiving the material, as demonstrated by their active participation in a brief discussion. The majority of participants in this activity had never been involved in food product diversification training, which was one of the reasons why they were interested in participating in the training. In general, the majority of participants finally understood the importance of food product diversification for MSMEs.

The next activity was a demonstration/simulation of making new products, which was attended by partners. The products made were from local food ingredients, namely tuna, which had previously been processed by MSMEs into shredded meat. The result of this activity was new fish nugget and fish ball products. The products were successfully formulated in accordance with a brief SOP covering the composition of ingredients used, process stages, and simple quality control points such as time, temperature used, and product texture.



Figure 2. Simulation of fish nuggets and fish balls

Food diversification training is an activity to improve skills in processing local food ingredients into a variety of other products with higher economic value. The diversification training is expected to encourage MSMEs to offer more products and reach new market segments. MSMEs will no longer depend on a single type of product, thereby minimizing the risk of loss in the event of a decline in sales. Product diversification will also enable MSMEs that have undergone training to enter different markets, making them more competitive and offering a wider range of products.

Table 1. Pre-test and Post-test Results of Participants' Knowledge

Knowledge Category	Pre-test n (%)	Post-test n (%)
Low	6 (40,0)	0 (0,0)
Moderate	7 (46,7)	3 (20,0)
Good	2 (13,3)	12 (80,0)
Total	15 (100)	15 (100)

The pre-test results indicated that the majority of participants were in the low to moderate knowledge categories regarding product diversification and food safety practices. Following the implementation of the training and mentoring activities, the post-test results demonstrated a descriptively significant improvement, with most participants (80.0%) reaching the good knowledge category and no participants remaining in the low category. These findings indicate that the training activities were effective in improving participants' understanding of processed fish product diversification and the basic implementation of standard operating procedures (SOPs) in production. This is consistent with the findings of Islami et al. which indicate an improvement in business actors' understanding of developing product variations and marketing strategies, as well as increased interest in producing new product variants after the training. Furthermore, Arifianto et al. also found that training activities significantly enhanced participants' knowledge and skills, along with increased enthusiasm for practicing diversification of processed fish products. These findings confirm the effectiveness of training programs in facilitating participatory knowledge transfer.

The subsequent activity involved an initial organoleptic evaluation of product acceptance. Organoleptic testing is a method of food assessment based on preference levels and perceptions of a product, using the human senses as the primary tools to evaluate acceptability (Gusnadi et al., 2021). This evaluation was conducted on two diversified products, namely fish nuggets and fish balls, by assessing the aspects of color, aroma, taste, texture, and mouthfeel. The initial evaluation results indicated that both products were generally well accepted by the panelists, particularly in terms of color, aroma, taste, and mouthfeel. However, the texture aspect of both products still required improvement. Feedback from the panelists highlighted the need for standardizing seasoning to maintain flavor consistency, adjusting the ratio of binding ingredients (flour and eggs) as well as the particle size of meat and vegetables to achieve better texture, and standardizing portion size and weight per unit to support more accurate pricing and nutritional labeling.

Table 2. Summary of the Initial Evaluation of Processed Fish Product Acceptance

Aspect	Fish Nuggets	Fish Balls	Agreed Improvement Notes
Color	Accepted	Accepted	Standardization of steaming/frying time
Aroma	Accepted	Accepted	Reduction of fishy odor (adjustment of spices/ginger/lime)
Taste	Accepted	Accepted	Standardization of seasoning proportions
Texture	Needs improvement	Needs improvement	Adjustment of flour-egg-fish ratio and heating time
Mouthfeel	Accepted	Accepted	Improvement of product chewiness and density

These evaluation results indicate that the utilization of fisheries commodities, particularly marine fish, offers advantages for the development of processed products due to the relatively stable availability of raw materials and supply-side efficiency. These findings provide a basis for MSME partners to refine their products prior to entering the limited production trial stage.



Figure 3. Organoleptic testing of fish nuggets and fish balls

In the context of food processing at the MSME scale, the organoleptic test conducted serves as an initial evaluation tool to assess product feasibility before wider-scale production. Through this test, MSMEs can obtain direct feedback on product strengths and weaknesses, particularly in terms of flavor consistency, tenderness, chewiness, and portion suitability. This information provides an important basis for refining product formulations and production processes, including adjustments to ingredient composition, cooking time, and the use of binding agents. In addition, organoleptic testing supports efforts to standardize the quality of processed food products. Sensory standardization is necessary to maintain consistency in quality across production batches, enhance consumer trust, and support pricing strategies and nutritional labeling. For food MSMEs based on local resources, the application of simple yet structured organoleptic testing can serve as an initial step toward improving product competitiveness in an increasingly competitive market. Thus, organoleptic testing functions not only as a tool for assessing product acceptability but also as a strategic instrument for product development, quality control, and value addition of processed food products derived from local commodities.



Figure 4. Community service team with MSME partners

Overall, the results of this community service program indicate that product diversification training based on fish commodities, accompanied by the implementation of production standard operating procedures (SOPs) and initial organoleptic evaluation, was able to produce tangible impacts on strengthening the capacity of MSME partners. Improvements in participants' understanding, as reflected in the pre-test and post-test results, the successful development of new products, and the presence of structured feedback from sensory evaluation demonstrate that a participatory training approach is effective in transferring practical knowledge and skills.

These findings emphasize that product diversification functions not only as a technical strategy for processed food development but also as an important instrument for enhancing MSME

competitiveness, improving the efficient utilization of local resources, and preparing business actors to enter more sustainable stages of production and marketing. Accordingly, this program provides a strong foundation for MSME partners to further refine their products and conduct limited production trials as a subsequent step toward strengthening the local economy based on processed food products.

Conclusion

The local food diversification training conducted for the Abon Ikan Inang MSME successfully enhanced the partner's capacity in developing processed fish products based on local commodities. This program resulted in the development of two new products, namely fish nuggets and vegetable fish balls, which were formulated through the implementation of production standard operating procedures (SOPs) and evaluated through an initial organoleptic product acceptance assessment. The evaluation results indicated good panelist acceptance, accompanied by constructive feedback related to seasoning, texture/tenderness, and portion uniformity, as well as improved partner understanding and commitment to food safety practices and limited production trials. The novelty of this program lies in the integration of diversification training, process standardization, and simple sensory evaluation as an approach to enhancing the competitiveness of food-based MSMEs. Practically, this activity provides applicable guidance for MSMEs in product differentiation and quality control, while conceptually reinforcing the role of local resource-based diversification in preparing MSMEs to enter broader market segments.

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