TRAINING ON PROCESSING BANANA STEMS INTO CHIPS: FOOD PRODUCT INNOVATION BASED ON LOCAL POTENTIAL IN HILIAMURI VILLAGE

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Abstract
This community service activity aims to improve the skills and knowledge of Hiliamuri Village residents, Teluk Dalam District, South Nias Regency, through training on processing banana midribs into chips as a food product innovation based on local potential. The participants consisted of 35 members of the Family Welfare Empowerment (PKK) group of Hiliamuri Village. The method used was a participatory approach including lectures, demonstrations, hands-on practice, and evaluation. The results showed that all participants successfully understood and independently practiced the banana midrib chip-making process, from raw material selection, cutting, soaking, seasoning, frying, to packaging. This activity successfully raised community awareness regarding the economic value of banana midribs previously considered agricultural waste. This training is expected to encourage the growth of sustainable micro-enterprises based on local potential to improve the economic welfare of Hiliamuri Village community.
Keywords: *Banana Midrib, Chips, Training, PKK, Community Empowerment, Local Potential*

A. Introduction

Indonesia is one of the world's largest banana-producing countries, with production spread across various rural areas, including on Nias Island, North Sumatra. The banana plant (*Musa* sp.) not only produces fruit of high economic value, but also yields various other parts that are often not utilized optimally, one of which is the banana stem. Until now, banana stems have only been regarded as agricultural waste discarded after the harvesting process. In fact, the potential of banana stems as raw material for alternative food products is enormous. According to Tanjung et al. (2023), banana stems can be processed into snack products such as chips that have a savory taste and high selling value when processed with the right techniques and seasoning. This condition indicates a great opportunity that has not been maximally utilized by rural communities, particularly in Hiliamuri Village.

Hiliamuri Village is one of the villages with a fairly abundant banana plantation potential. However, the local community does not yet have adequate

knowledge and skills to process parts of the banana plant other than its fruit. This condition is in line with the findings of Sari et al. (2025), who stated that banana stem has high potential selling value but has not been optimally utilized by communities in various rural areas of Indonesia. Most people still discard banana stems after fruit harvesting, causing the economic potential of this waste to be lost without providing any real benefit to improving family welfare.

In terms of nutritional content, banana stems have been proven to have nutritional values worthy of consumption. Suryani and Ekowati (2022) affirmed that banana trunks and stems contain water 68.9 g, carbohydrates 18.5 g, protein 0.32 g, fat 2.11 g, calcium 715 mg, phosphorus 117 mg, iron 1.6 mg, as well as vitamins B and C, making banana stems suitable as a source of alternative food ingredients. Furthermore, the high dietary fiber content in banana stems makes them potentially valuable as raw material for healthy snack products that are beneficial to human health. Lubis et al. (2023) also stated that utilizing banana stems and corms into snack products not only provides additional economic value but also contributes to improving the nutritional status of rural communities.

The problem of low utilization of local potential is closely related to the community's limited knowledge of food product innovation. According to Sagajoka et al. (2021), processing innovations for chips made from banana trunks and stems have been proven to significantly improve the rural community's economy while also opening up new and sustainable business opportunities. This is reinforced by Ngaisyah et al. (2022), who reported that empowering women farmer groups through optimizing banana stem processing can encourage economic independence and increase community production capacity. Thus, intervention through training activities is one of the most relevant and effective approaches to addressing these challenges.

Community service activities that prioritize local food production skills training have been proven to have a real impact. Bara et al. (2025) stated that skills training in managing locally processed food products can measurably improve the knowledge and practical abilities of the community. Furthermore, Hasbiyadi et al. (2023) demonstrated that the processing of banana trunks into chips as a form of community creativity can significantly increase the income of village residents. Both findings reinforce the urgency of implementing a similar training program in Hiliamuri Village as an effort toward economic empowerment based on local potential.

Theoretically, this activity is grounded in the theory of community empowerment, which emphasizes the importance of increasing individual and group capacity through non-formal education, skills training, and business mentoring. According to Irwan et al. (2023), the community empowerment model based on food self-sufficiency has proven effective in alleviating poverty and improving the welfare of rural communities. This theory is relevant to the context of training implementation in Hiliamuri Village, where community members are provided with concrete skills that can be directly practiced to produce marketable products. In addition, the approach of food product innovation based on local potential is also aligned with the concept of food diversification the effort to develop various processed products from local biological resources to strengthen food security and the local economy.

In a broader context, the utilization of agricultural waste such as banana stems is also consistent with the principles of circular economy, which promotes waste reduction and the enhancement of resource added value. Febrianto et al. (2024) reported that women's economic empowerment through the development of banana stem chip products in rural areas successfully increased household income while also reducing the volume of unutilized organic waste. Meanwhile, Padmudji et al. (2023) affirmed that community-level product innovation involving banana stem chips was able to strengthen local economic empowerment and open up new competitive markets.

Based on the entire background described above, the training activity on processing banana stems into chips in Hiliamuri Village is a highly relevant and urgent strategic step to be implemented. This activity aims to: (1) increase the knowledge and skills of the Hiliamuri Village community in processing banana stems into chip products of high economic value; (2) encourage the growth of local food product innovation based on the village's natural resource potential; and (3) open up micro-business opportunities for the community as an effort to improve welfare and economic independence of the village. It is hoped that the success of this program can serve as a community empowerment model that can be replicated in other villages with similar potential, while also strengthening the position of local food products on the map of Indonesia's creative economy.

B. Implementation Method

This community service activity was carried out in Hiliamuri Village, Teluk Dalam District, South Nias Regency, North Sumatra Province. The selection of the location was based on the abundant

banana plantation potential in the village that has not been optimally utilized by the community, particularly in processing banana stems into food products of economic value. The subjects in this activity were residents of Hiliamuri Village who are members of the Family Empowerment and Welfare (PKK) group, with a total of 35 participants who attended and actively participated in the entire series of training sessions.

The PKK group was selected as the target partner because of its strategic role in family food processing and household economic empowerment at the village level. According to Pratiwi (2023), PKK mothers are effective agents of change in local food processing programs because their involvement directly relates to the management of daily family consumption.

The method used in this community service activity is a participatory method that combines several approaches, namely: lectures/counseling, direct demonstration (demonstration method), hands-on practice, and evaluation. The participatory approach was chosen because it encourages the active participation of every participant in all stages of the activity regardless of their educational background or age. This method has been proven effective in community empowerment activities based on local food processing (Ginting et al., 2022). The implementation of the activity was divided into four main stages, namely: (1) the preparation stage, (2) the training implementation stage, (3) the hands-on practice stage, and (4) the evaluation stage.

First Stage: Preparation. At this stage, an initial observation was conducted at the partner's location to identify the conditions, needs, and potential of the Hiliamuri Village community. The observation was carried out through direct observation and structured interviews with community leaders, PKK administrators, and local residents. Initial coordination was also conducted with the village head and the PKK chairperson to determine the schedule, venue, and participant readiness. In addition, the implementation team prepared banana stem raw materials, processing equipment, seasonings, and a training module compiled in a simple and easily understandable manner for all participants.

Second Stage: Counseling and Lectures. Before the practice began, participants were provided with lecture and counseling materials covering: (a) the potential and nutritional content of banana stems as alternative food raw materials; (b) hygienic and safe processing techniques; and (c) micro-business opportunities based on local products. According to Ndejeg et al. (2024), providing theoretical knowledge before

practice is very important for building participants' understanding of the economic value of the materials to be processed, so that participants' motivation and enthusiasm increase significantly.

Third Stage: Demonstration and Hands-On Practice. At this stage, the implementation team directly demonstrated the process of making banana stem chips, starting from the selection of fresh and quality raw materials, the cleaning process, cutting to uniform thickness, soaking to remove sap, seasoning, through to frying and packaging. Following the demonstration, all 35 PKK participants were directly involved in every stage of the production process. The lecture method combined with demonstration has been proven to have a significant positive impact on participants' understanding and skills in food processing training activities (Ansar et al., 2024). During the practice, the implementation team provided mentoring and guidance to participants so that each stage was carried out correctly and hygienically.

Fourth Stage: Evaluation. Evaluation was conducted at the end of the activity to measure the level of training success. The evaluation was carried out in two ways: (1) direct observation of participants' ability to independently practice making banana stem chips; and (2) question-and-answer sessions and group discussions to measure participants' understanding of the material that had been delivered. According to Andini and Rizki (2024), evaluation through group discussions and direct observation is an appropriate method for measuring the effectiveness of skills-based training at the village community level. The evaluation results showed that all participants were able to follow and practice the steps of making banana stem chips well and enthusiastically.

Data in this activity were collected through three instruments, namely direct observation, interviews, and photographic documentation of the activity. Furthermore, the data were analyzed descriptively and qualitatively, by describing and explaining the training implementation process as well as the participants' responses and skill achievements during the activity. This descriptive qualitative approach is consistent with the characteristics of community service activities that emphasize the process of knowledge and skills transformation in the field (Sagajoka et al., 2021). The success of this program was measured by indicators including increased participant knowledge about banana stem processing, participants' ability to independently produce chips, as well as participants' enthusiasm and

intention to continue production activities after the training was completed.

C. Results and Discussion

1. General Overview of Activity Implementation

The community service activity in the form of training on processing banana stems into chips was successfully carried out in Hiliamuri Village, Teluk Dalam District, South Nias Regency. This activity was attended by 35 participants who are residents of Hiliamuri Village and members of the Family Empowerment and Welfare (PKK) group. The training took place in the evening at the village meeting hall, demonstrating the high enthusiasm and readiness of the community to participate in the activity even though it was held outside of working hours. Overall, the training activity ran smoothly, in an orderly manner, and with great enthusiasm from all participants. The series of activities took place in four main stages, namely: (1) opening and presentation of materials, (2) introduction of tools and materials, (3) direct demonstration and hands-on processing practice, and (4) evaluation and joint documentation.

2. First Stage: Opening and Presentation of Materials

The first stage of the training activity was the opening session, which was simultaneously filled with a brief presentation of materials on banana stems and their benefits as food raw materials. The opening was led by the student implementation team, who were visibly wearing dark maroon academic jackets as the official identity of the higher education institution overseeing this community service program. The atmosphere of the village hall was simple yet conducive, with participants seated in a circle and the implementation team standing at the front to lead the proceedings.

During the opening session, one member of the implementation team delivered a welcome address along with an introduction to the material for all participants present. The material covered several important points, including: the background and objectives of the training activity, the abundant potential of banana plants in Hiliamuri Village and its surroundings, the importance of utilizing banana stems that have long been regarded merely as agricultural waste, as well as the nutritional and economic value contained in banana stems when processed into food products. The implementation team explained in simple and easily understandable language that banana stems contain considerably high dietary fiber along with various important minerals that are beneficial to human health. All PKK participants appeared to listen attentively to the material presented.

The participants' enthusiasm was evident from their curious facial expressions and the active engagement of several participants who raised questions during the presentation. This is in line with the statement of Ndejeg et al. (2024) that an informative and communicative opening session plays a major role in building participants' motivation before entering the food processing practice stage.

Figure 1. Opening of the Activity and Presentation of Materials by the Implementation Team

Source: Documentation of Community Service Activities in Hiliamuri Village, 2022

3. Second Stage: Introduction of Tools and Materials

The second stage was the session introducing the tools and materials to be used in the banana stem chip-making process. The implementation team stood in front of the participants while directly holding and presenting the main material of the activity banana stems that had been cleaned of their outer layers. The banana stems used appeared yellowish-white in color, with a solid yet soft texture and a distinctive cylindrical shape. On the demonstration table, various neatly prepared equipment and supporting materials were also visible, including pink and green plastic containers, mixed ingredients, and other processing equipment.

The main materials used in making banana stem chips include:

Main and Supporting Ingredients: The main ingredient used was the inner core of fresh banana stems, which were yellowish-white in color. This inner part was chosen because it has a softer texture, good fiber content, and is not too bitter, making it easier to process and more palatable to consumers. Other supporting ingredients included flour as a coating material, eggs as a batter binder, garlic as the basic seasoning providing a savory aroma, cooking oil as the frying medium, and sambalado or dry spicy chili seasoning as the finishing spice sprinkled over the chips after they were cooked to give an appetizing spicy flavor.

Equipment Used: The equipment introduced to participants included: a gas stove as the heat source for frying, a medium-sized wok or pan for frying the chips, a large spoon for stirring and turning the chips during frying, a strainer or slotted spoon for lifting the cooked

chips from the hot oil, a knife for cutting the banana stems, a cutting board as a cutting surface, a bowl or basin for soaking and mixing ingredients, and a serving container to hold the finished chips.

The implementation team also specifically explained how to peel and select banana stems that are suitable for processing. Participants were taught that the ideal banana stem for making chips is one that is still fresh, taken from a recently harvested banana tree, or from an inner stem layer that has not yet turned black. The outer layer of the stem, which has a coarse fibrous texture and brownish color, must first be peeled away until only the inner core remains clean white and with a chewy texture. This peeling technique was carried out carefully using a knife, following the natural layers of the stem. The correct method of selecting and peeling the raw material is one of the key factors determining the quality of the resulting chips, particularly in terms of texture and flavor.

Figure 2. Introduction of Tools and Materials for Making Banana Stem Chips

Source: Documentation of Community Service Activities in Hiliamuri Village, 2022

4. Third Stage: Demonstration and Processing Practice

The third stage was the core of the entire training activity series — the direct demonstration and hands-on practice of making banana stem chips. This session was extremely lively and spirited. All PKK participants were seen seated attentively in a circle facing the demonstration table where the implementation team demonstrated the processing steps one by one. On the demonstration table, a lit gas stove with a wok containing hot cooking oil was visible, along with various materials that had been neatly prepared. Several members of the implementation team were actively working in the processing area, while one person documented the activity using a mobile phone.

The banana stem chip-making process demonstrated and practiced together included the following steps:

- Step 1 – Preparation and Cutting of Ingredients. The peeled inner banana stems were then cut into small rectangular or oblong pieces approximately 2–3 cm in size. The

cutting was done uniformly so that the resulting chips would have a consistent size, ensuring even cooking during frying. Participants were taught that the thickness of the cut greatly affects the crispiness of the chips, so it is advisable not to cut them too thick in order to ensure they cook perfectly and achieve a crunchy texture.

- Step 2 – Soaking in Water. The cut banana stem pieces were then soaked in clean water for approximately 10 minutes. This soaking process aimed to reduce the natural sap content in the banana stems, thereby minimizing the bitter and slightly astringent taste that might emerge. After soaking, the stem pieces were drained until excess water was reduced before moving on to the seasoning stage.
- Step 3 – Preparing the Seasoning Batter. While the banana stems were soaking, the implementation team prepared the coating batter. Garlic was peeled and ground, then mixed together with flour, eggs, and a little salt in a sufficiently large container. All ingredients were stirred until evenly combined to form a slightly thick batter. The correct batter consistency is very important so that the seasoning layer adheres perfectly to the banana stem pieces, resulting in chips with a savory and crunchy texture.
- Step 4 – Mixing Ingredients with the Batter. The drained banana stem pieces were then placed into the seasoning batter and stirred until the entire surface of each piece was perfectly coated. This process was carried out carefully so that the batter adhered evenly to all parts of the banana stem pieces without any being missed.
- Step 5 – Frying. The batter-coated banana stem pieces were then fried one by one into a wok of hot oil over medium heat. The frying process was carried out while occasionally stirring to ensure even cooking on all sides. The chips were fried until golden yellow and produced a crispy sound indicating that the moisture content had been optimally reduced. Once cooked, the chips were lifted using a slotted spoon and drained in a lined container to absorb excess oil.
- Step 6 – Adding Sambalado. As the finishing touch that gives this product its distinctive character, the cooked and drained banana stem chips were then mixed with sambalado a dry spiced chili seasoning that imparts a special

flavor to the product. The mixing process was carried out by stirring the chips together with the sambalado evenly until the entire surface of the chips was coated with the spicy seasoning. The result was banana stem chips that were savory, crunchy, spicy, and extremely appetizing.

During this practice stage, the PKK participants not only observed the demonstration but also became directly involved in every stage of the processing. Participants took turns trying to cut the banana stems, prepare the seasoning batter, and fry the chips under the guidance of the implementation team. This active involvement of participants created a very dynamic and spirited atmosphere. According to Ansar et al. (2024), direct participation of participants in food processing practice significantly increases knowledge retention and participants' ability to independently apply these skills in the future. Sagajoka et al. (2021) also affirmed that the use of locally available raw materials that are freely obtainable in the surrounding environment is the main key to the successful development of micro-enterprises at the village level.

Figure 3. Demonstration and Direct Practice of Banana Stem Chip Processing with PKK Participants

Source: Documentation of Community Service Activities in Hiliamuri Village, 2022

5. Fourth Stage: Evaluation and Joint Documentation

The final stage of this training activity series was the evaluation and joint documentation session conducted after the entire processing procedure was completed. All training participants consisting of PKK members along with the student implementation team gathered for a group photo as a symbol of success and togetherness in this activity. This group photo was taken inside the village meeting hall in a warm, friendly, and joyful atmosphere. Participants were seen seated in the front rows while the implementation team stood in the back rows. Among the participants, some were also seen holding plates of banana stem chips produced together, as a tangible symbol of the training activity's success.

During the evaluation session conducted before the group photo, the implementation team posed a number of questions to participants to measure the extent of understanding and skills absorbed during the activity. The results were very satisfying: all participants were able to correctly answer questions about the stages of making banana stem chips, including the importance of the soaking process, correct cutting techniques, and the necessary ingredient composition. Beyond that, the majority of participants expressed confidence in their ability to independently practice making banana stem chips at home. Several participants even expressed their intention to make banana stem chips a source of additional family income, whether through direct sales to neighbors, local traditional markets, or through social media.

Figure 4. Group Photo of the Implementation Team and PKK Participants After the Training Activity

Source: Documentation of Community Service Activities in Hiliamuri Village, 2022

6. Factors Supporting the Success of the Activity

The successful implementation of this training activity was supported by several important factors. First, the extremely high enthusiasm and active participation of all PKK participants from the opening session through to the final evaluation. Second, the abundant availability of banana stem raw materials in Hiliamuri Village made this activity highly relevant and easily applicable by the local community. Third, the simple chip-making process that does not require special technology makes this product very easily replicable by anyone, even by housewives without any background in food processing. Fourth, the spirit of togetherness within the PKK group strengthened participants' determination to collectively develop the banana stem chip processing business as a flagship village product. Pratiwi et al. (2022) stated that the factor of togetherness and solidarity in women's groups such as PKK constitutes a very valuable social capital in building the sustainability of local potential-based food processing businesses.

7. Outputs and Impact of the Activity

Overall, this community service activity produced several tangible and measurable outputs. From the knowledge aspect, all participants experienced an increase in understanding of the potential of banana stems as a food raw material of economic value. From the skills aspect, participants successfully produced banana stem chips independently with results that were fit for consumption and had a good flavor. From the economic aspect, the activity opened participants' horizons to micro-business opportunities based on agricultural waste that can become a sustainable source of additional income for families. Meanwhile, from the environmental aspect, the utilization of banana stems which were previously discarded into marketable products contributed to the reduction of organic waste in the village environment. Febrianto et al. (2024) affirmed that a successful banana waste processing training program not only impacts household economic improvement but also concretely contributes to the cleanliness and environmental sustainability of the village. Thus, the success of this training serves as tangible proof that simple innovation based on local potential, when implemented with the right methods and serious mentoring, can provide significant transformative impact on the welfare of rural communities.

D. Conclusion

The community service activity in the form of training on processing banana stems into chips in Hiliamuri Village, Teluk Dalam District, South Nias Regency was successfully implemented and achieved all of the established objectives. This activity was attended by 35 participants who are members of the PKK group of Hiliamuri Village and took place in four stages, namely the opening and presentation of materials, introduction of tools and materials, direct demonstration and hands-on processing practice, and joint evaluation.

The results of the activity showed that all participants successfully understood and directly practiced the banana stem chip-making process, from the selection and peeling of raw materials, cutting, soaking, preparation of the seasoning batter, frying, through to mixing with sambalado as the product's finishing touch. The simple processing procedure that requires no special equipment and uses raw materials freely available in the village environment makes this product highly potential for development as a sustainable home-based micro-enterprise by the Hiliamuri Village community.

The success of this training proves that banana stems, which have long been regarded merely as agricultural waste, actually possess high economic and nutritional value when processed with the right techniques. This food product innovation based on local potential is not only capable of improving the community's skills and knowledge, but also opens up new business opportunities that can concretely contribute to increased family income and welfare.

Accordingly, this community service program is hoped to serve as a sustainable empowerment model that can be replicated in other villages with similar potential. Continued mentoring, product marketing support, and business management guidance are needed so that Hiliamuri Village's banana stem chips can develop into a competitive local flagship product capable of penetrating a broader market.

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