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Empowering Aisyiyah Mothers Using a Humanity Literacy and Creativity Approach by Maximizing the Function of Banana Heart Natural Materials as Entrepreneurial Embryos

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Abstract

Kepok banana blossoms in Colomadu District have abundant vegetation potential, but their utilization is still limited to traditional wet processing that spoils quickly. As a result, this commodity often becomes organic waste (food waste) and has no economic value. This community service activity aims to empower women's groups through the diversification of functional food products into banana blossom floss, which has high economic value, is hygienic, and has a long shelf life. The target partners of this program are the administrators and core members of the Colomadu Aisyiyah Branch Leadership (PCA) Women, Karanganyar Regency. The implementation method applied combines a community education approach on nutritional literacy, science and technology diffusion in the form of appropriate technology for mechanical spinner machines, and training in airtight commercial packaging. The program successfully enabled participants to independently produce marketable banana blossom floss with a dry-crispy texture, savory meat-like flavor, and extended shelf life without chemical preservatives. Quantitative evaluation showed a high level of program effectiveness, with partner satisfaction ranging from 80% to 100% across indicators of goal achievement, product quality, communication effectiveness, and resource utilization. This community service concludes that integrating local resource utilization with appropriate technology and entrepreneurship training effectively strengthens women's productive capacities and transforms underutilized agricultural resources into value-added products. The program contributes to improving household food security, reducing organic waste, increasing women's economic independence, and promoting sustainable community-based creative entrepreneurship in suburban areas.

Keywords: Shredded Banana Heart, Women's Empowerment, Local Food Security, Creative Economy, Aisyiyah Mothers

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Introduction

Indonesia plays a strategic role in the global horticultural export sector, particularly as a major producer of bananas [1]. Based on annual trend data, banana production in Indonesia generally continues to increase. Even though it fluctuated, it declined in 2015, then rose again, and declined again in 2024. This commodity remains a promising agricultural favorite [1] [2]. Apart from their abundance, bananas have high nutritional value and antioxidant levels [3]. This commodity plays an important role in the consumption patterns of Indonesian society because of its high accessibility across all social layers regardless of economic level [4]. The functional value of banana plants is not only limited to the fruit but also to other vegetative parts, one of which is the banana flower, which can be processed into high-quality functional food products [5].

Biologically, one banana tree is generally only able to produce one fruit bunch and one banana flower [6]. Banana flowers are dark purplish-brown on the outside, with petals that enclose whitish-yellow flowers at the base. The dimensions of a banana flower range from 25 to 40 cm, with the size of the middle loop reaching 12-25 cm [7]. According to Rukmana [8], banana blossoms are rich in calories, protein, carbohydrates, vitamin A, water, and phosphorus. Another important component that complements the functional value of banana blossoms is their high dietary fiber content, along with low fat and protein [9]. With these chemical characteristics, banana blossoms have great potential for development into commercial processed food products. This commodity also contains vitamin E, which acts as an exogenous antioxidant in the body, and provides important micronutrients such as magnesium, iron, potassium, calcium, and phosphorus. Among all these substances, fiber, carbohydrates, and potassium are the most dominant components [10]. Proportionate consumption of banana blossoms has been proven to provide various clinical benefits, such as warding off free radicals, relieving menstrual pain, reducing the risk of diabetes, maintaining a healthy digestive tract, overcoming infections, preventing cancer, maintaining heart health, supporting weight loss programs, and preventing prostate enlargement [11].

Even though it has significant nutritional value and health properties, optimizing processing techniques is necessary to increase its acceptability and public interest [12]. However, to date, the diversification of banana blossom-based food dishes remains very limited [13]. Conventional use in society is generally limited to processed lodeh or stir-fried vegetables [14]. In fact, the characteristics of banana blossoms, which are rich in nutrients (calcium, phosphorus, and vitamins A and C) and low in fat, are very suitable for supporting healthy diet patterns, especially among the younger generation, as well as being effective in increasing colon motility for digestive health [15]. This lack of processing innovation keeps the economic value of banana blossoms at the farmer level low and prevents them from making a significant contribution to family income [16].

This condition is consistent with the reality observed in Colomadu District, Karanganyar Regency. Geographically, this area is a strategic buffer for the city (suburban) [17]. Colomadu has the potential for very abundant banana tree vegetation, with almost every resident's yard growing with this commodity [18]. However, the potential of these raw materials has not been

balanced with optimal utilization at the community level [19]. Based on the results of initial assessments and interviews with the Aisyiyah (PCA) Colomadu Branch Manager in March 2025, the majority of people in Colomadu District are not yet aware of innovations in diversifying banana flower processing, particularly for the kepok banana variety. Even though raw materials are abundant, their use remains traditional and limited to short-term household consumption, with no effort to process them into high-value products. Furthermore, the needs assessment revealed that the partner community also faced limited entrepreneurial knowledge, inadequate product packaging skills, and a lack of appropriate processing technology, making it difficult for women to convert locally available banana blossoms into sustainable, income-generating products. Consequently, the abundant natural resources have not contributed optimally to household economic resilience.

The gap between the theoretical nutritional content and its low utilization at the partner level raises specific problems. Banana blossoms in Colomadu are only processed into ready-to-eat food with the characteristics of traditional wet dishes, which spoil quickly (low shelf life). As a result, when there is excess production, banana blossoms are often not utilized optimally; most of them are sold only to traditional markets at very low prices or end up as organic waste that is simply thrown away. The issue of food waste and the low economic productivity of women in suburban areas is a real challenge that must be resolved immediately [20].

Several previous community service activities have demonstrated that local banana blossom-based food processing can improve the community-based family economy [21]. Research and dedication by other service providers show that the application of dry food processing technology, such as vegetarian shredded meat, effectively extends the product's shelf life for months without compromising its fiber content [22]. In addition, the involvement of religion-based women's organizations, such as Aisyiyah and PKK, in downstreaming agricultural products has proven to be a major driving force for the recovery of the creative economy and the strengthening of household-level food security [19], [23]. Strengthening upstream-downstream competencies, from production to digital marketing management, within the women's community has been empirically shown to transform domestic roles into productive roles with financial value [24], [25], [26]. Nevertheless, most previous community service programs have primarily focused on food processing activities and have paid limited attention to integrating appropriate technology, entrepreneurship development, commercial packaging, and humanity literacy as a comprehensive community empowerment strategy. This gap provides the rationale for implementing the present community service program.

Therefore, the implementation team implemented Shredded Banana Hearts as a strategic solution to address the problems faced by PCA Colomadu partners. This choice is based on two crucial considerations. First, product stability: shredded meat has a very low water content, so it has a long shelf life [27]. This succeeded in overcoming partner problems related to products that quickly went stale and in expanding marketing reach. Second, increasing economic value added (value added): Raw banana blossoms, which

initially had low economic value, saw their selling value increase significantly after being transformed into shredded products [16]. In addition, the fiber texture of the kepok banana flower, resembling meat fiber, provides a competitive advantage in the "healthy food" market segment, which is growing rapidly in suburban areas such as Colomadu [28].

Before this community service program was implemented, there had never been any training or mentoring activities related to making banana blossom floss in the Colomadu District area. The proposing team offers a comprehensive solution by providing education, outreach, and gradual training based on SMART (Specific, Measurable, Achievable, Relevant, Time-bound) flows [29]. This program not only focuses on upstream production processes guided by a team of experts but also offers downstream entrepreneurship workshops covering hygienic packaging techniques and effective marketing strategies, ensuring these products are ready to be designated as independent MSME commodities for Aisyiyah mothers, produced directly from their homes. In addition, the program adopts a humanity literacy approach by encouraging collaboration, social responsibility, collective problem-solving, and active participation throughout the learning process, thereby strengthening both participants' technical competencies and their social capacity for sustainable community development. Furthermore, the program is grounded in the principles of humanity literacy, promoting social competence, life skills, progressive values, and sustainability through the utilization of local resources, thereby empowering women not only as economically productive individuals but also as agents of resilient and community-oriented social transformation.

Based on all the background descriptions above, the aim of this community service activity is to empower Aisyiyah PCA Colomadu mothers through diversification and innovation in the use of kepok banana blossoms to become shredded banana heart products, which have high economic value, are hygienic, and have a long shelf life, as well as equipping partners with business management skills to improve the family's financial welfare. Beyond improving technical production skills, this program seeks to strengthen women's economic independence, reduce organic food waste, optimize the utilization of local resources, enhance household food security, and promote sustainable community-based creative entrepreneurship. These expected outcomes demonstrate the program's broader contribution to improving community welfare and resilience by empowering local resources.

Method

The method used in this community service program for the Aisyiyah Women's Branch Leadership in Colomadu District, Karanganyar Regency, combines several strategic approaches, including (a) Community education, through interactive outreach to increase partners' understanding and awareness of the nutritional and economic potential of banana blossoms; (b) Science and technology diffusion, through the application of appropriate technology in the form of an oil spinner to produce long-lasting dried food products; and (c) Training, through demonstrations, pilot projects, and intensive mentoring to develop concrete entrepreneurial motor and managerial skills in the target group.

These three complementary approaches were integrated into a sequential work plan designed to achieve the program objectives, namely increasing participants' knowledge, improving practical production skills, strengthening entrepreneurial capacity, and encouraging the sustainable utilization of local resources for household income generation.

This community service program was implemented in stages in the second week of May, specifically on Wednesday, May 13, 2026, at the Japanan Village Meeting Hall, Baturan, Colomadu District, Karanganyar Regency, Central Java Province. All activities adhere to a structured and measurable Work Breakdown Structure (WBS) to ensure efficient implementation and sustainable results. The project was organized into three interconnected phases: (1) preparation and needs assessment, (2) implementation through education, technology transfer, and practical training, and (3) monitoring and evaluation to measure program effectiveness and ensure sustainability. Each phase was designed to progressively build participants' competencies and support the achievement of the community empowerment objectives.

The systematic implementation flow of this community service program is depicted in Figure 1. The operational details of each activity stage presented in Figure 1 are outlined as follows:

1. Preparation and Permitting Stage (Pre-Activity)

This initial stage focuses on strengthening formal legality, establishing a common understanding, and conditioning the team and partners internally. This intensive phase lasts approximately one to two weeks.

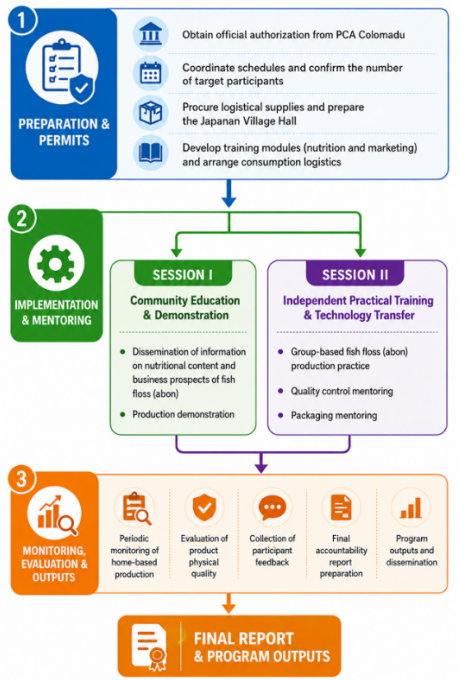


Figure 1. Implementation Method in Work Breakdown Structure

The primary objective of this stage was to ensure that all administrative, logistical, and technical requirements were fulfilled before implementation while identifying partner needs and aligning the activity plan with community expectations. It includes:

a. Partner Permit Processing: The proposing team processes the official bureaucratic permit documents with the Colomadu Aisyiyah Branch Leadership (PCA) community. The output of this stage is the issuance of a legal permit and the acquisition of full support from all levels of management as target partners.

b. Schedule and Target Coordination: Two-way communication is conducted with the partner's core management to agree on the activity schedule. This phase successfully establishes a definite implementation time and secures the number of training participants to ensure the training remains conducive.

c. Equipment and Material Procurement: The team checked equipment availability and logistical expenditures two weeks prior to the event. All supporting instruments were successfully procured, including the conditioning of the Japanan Village Meeting Hall in Baturan as the main representative location for the event.
d. Preparation of Materials and Consumables: In addition to formulating comprehensive outreach materials (covering the clinical nutritional benefits of banana blossoms, standard processing methods, and micro-marketing strategies), the team also managed the provision of hygienic consumables to ensure participant comfort during the event.

2. Training and Mentoring Implementation Stage

The implementation of the core program is carried out through interactive training methods, discussions, and direct practical demonstrations, which are divided into two main meetings. This stage represents the core intervention of the project, where knowledge transfer, technology diffusion, and practical skill development were integrated to enable participants to independently produce marketable banana blossom floss. The operational details as follows:

a. First Meeting (Delivery of Material and Demonstration): The activity began with an official welcome by the Head of Aisyiyah Colomadu Branch. Next, we entered the community education method, where the resource person explained theoretical material regarding the nutritional chemical characteristics of the kepok banana flower and its business prospects as an MSME commodity that supports the family economy. The main event continued with a demonstration of making shredded banana hearts by the implementing team through a hygienic production process flow: (1) Boiling; (2) Enumeration; and (3) Processing.
b. Spinning Second Meeting (Independent Practical Assistance and Packaging): At the second meeting, the focus shifted to the training method, which involved assisting the participant group in making shredded meat independently. The team directly assisted each group throughout the upstream production process, from checking standard product quality (taste, color, and texture) to ensuring airtight, hygienic packaging techniques. In addition, participants were provided with online marketing strategies utilizing digital platforms (e-commerce and social media). The output from this stage was the completion of an example. quality processed products that are ready to be marketed.

At the end of this stage, participants were expected to demonstrate competence in hygienic production techniques, operate the spinner appropriately, package products in accordance with food safety standards, and understand basic marketing strategies for small-scale enterprises.

3. Monitoring, Evaluation, and Post-Activity Stages

After the entire training series is completed, the proposing team conducts the final stages to ensure the program's quality, standardization, and long-term sustainability. This phase was designed not only to assess

program outcomes but also to provide continuous assistance so that the acquired knowledge and skills could be sustainably implemented by the partner community. Activities include:

a. Monitoring: The team regularly monitors the progress of Aisyiyah mothers who are working to produce shredded meat independently at home. Two-way communication via instant messaging groups is maintained to validate product quality and assist partners who encounter technical problems during production or packaging.
b. Conducting Evaluation: Evaluation is carried out one week post-training through open discussions with partner administrators. Evaluation indicators include assessing the organoleptic and physical quality of shredded meat (suitability for consumption and shelf life) and gathering feedback from PCA Colomadu management on the program's economic benefits.
c. Preparation of Final Report: Based on field data, participant attendance lists, and valid visual documentation during the program, the team prepared a final report on the implementation of activities.
d. Output Preparation: The results of the service are realized in the form of concrete, effective outputs, namely the preparation of a detailed guidebook for making marketable banana blossom shredded fruit, as well as the dissemination of information through educational brochures and social media publications to expand the impact of this local food innovation to the wider community.

The project's effectiveness was evaluated based on participants' involvement, the quality of the shredded banana blossom products, the partners' ability to independently apply the processing techniques, and feedback on the program's usefulness in improving household economic opportunities.

Result and Discussion

This community service activity was conducted in person at the Japanan Village Meeting Hall in Baturan, Colomadu District, Karanganyar Regency, Central Java. The entire management and core members of the Colomadu Aisyiyah Branch Leadership (PCA) participated in this series of downstream programs, with very high attendance and participation. In line with the Smart, Measurable, Achievable, Relevant, Time-bound (SMART) framework outlined in the implementation methodology, this program was implemented through two main meetings structured as follows:

The first meeting, held on Wednesday, May 13, 2026, focused on internalizing theoretical (cognitive) aspects and piloting upstream production. The event began with an official opening session featuring warm remarks from the Chairperson of the Colomadu Aisyiyah Branch Leadership (PCA). The session concluded with a group photo of the proposing team and all target partners, as shown in Figure 2.

The agenda continued with the implementation of community education methods by disseminating materials on functional food innovation. In this session, the resource person presented a comprehensive overview of the strategic potential of the Colomadu suburban area, the natural fiber and

antioxidant content of Kepok banana blossoms, the concept of local food diversification, and the feasibility analysis of micro-enterprises. This socialization phase was very dynamic and interactive, with participants encouraged to actively discuss post-training market prospects and opportunities. The main event of the first meeting concluded with a live demonstration of the upstream production process by the proposing team for the participants. The team demonstrated standard processing techniques, including:

1. Measured boiling: Boiling Kepok banana blossoms in boiling water to neutralize the concentrated sap and remove any inherent astringency;
2. Longitudinal chopping: Chopping the banana flower petals to form fine strands of fiber that resemble the physical characteristics of meat fiber;
3. Cooking: Processing the fibers with a blend of natural spices and coconut milk over low heat until evenly dried.

The second meeting focused entirely on independent action-based training and science and technology diffusion methods. In this session, the Colomadu PCA women were divided into small groups to independently practice the entire Banana Blossom Floss production process, from raw material processing to cooking. The proposing team acted as technical facilitators, overseeing hygiene standards, fire control, and flavor consistency in each group.

The main focus of this second meeting was the introduction of appropriate technology, specifically a mechanical spinner (oil drainer). Participants were trained to operate the spinner for extracting post-frying oil. This process is crucial for producing abon with a dry-crispy texture and a long shelf life without chemical preservatives.

The series of downstream activities was completed with training in packaging techniques. Participants were guided to package the product neatly and hygienically in standard 100-gram commercial standing pouches with modern brand labels, as shown in Figure 3.



Figure 2. Opening and Photo of the Proposing Team with the PCA Colomadu Mothers



Figure 3. Independent Production and Packaging Practice

Table 1. Analysis of Program Success Achievements

No.	Questionnaire Assessment Indicator	Score 1 (%)	Score 2 (%)	Score 3 (%)	Score 4 (%)	Score 5 (%)
1	Achievement of project objectives in providing knowledge and skills for product innovation	0.00%	0.00%	0.00%	40.00%	60.00%
2	Success of the project in addressing problems or challenges faced by partners	0.00%	0.00%	20.00%	50.00%	30.00%
3	Fulfillment of established product requirements and specifications	0.00%	11.10%	0.00%	11.10%	77.80%
4	Effectiveness of communication and coordination among the proposing team during project implementation	0.00%	0.00%	20.00%	10.00%	70.00%
5	Timeliness of project implementation in accordance with the established schedule (timeline)	0.00%	0.00%	20.00%	20.00%	60.00%
6	Efficiency in utilizing available resources during the training activities	0.00%	0.00%	10.00%	20.00%	70.00%
7	Level of participation and active contribution from stakeholders (partners)	0.00%	0.00%	11.10%	22.20%	66.70%
8	Effectiveness of technical risk management in the field by the proposing team	0.00%	0.00%	20.00%	30.00%	50.00%
9	Significance of project benefits and overall partner satisfaction with project outcomes	0.00%	0.00%	10.00%	50.00%	40.00%

The series of activities concluded with participants completing an evaluation questionnaire. To measure the level of success, accountability, and effectiveness of the implemented community service program, the implementing team conducted a quantitative evaluation using a structured Likert-scale questionnaire (scores 1 to 5). Empirical data from the assessment results from the total respondents (N=10) are summarized in detail in Table I.

The data in Table 1 show a very significant level of success in knowledge transfer and mastery of functional food product innovation. For the first indicator related to the achievement of project objectives, 60% of participants gave the highest rating of 5, while the remaining 40% gave 4. This cumulative figure of 100% is clear evidence that the educational materials and upstream-downstream demonstration methods designed by the implementing team were very well absorbed by the PCA Colomadu mothers. This achievement is reinforced by the second indicator on the project's success in overcoming partner challenges, where the proportion of positive responses reached 80%, with cumulative scores of 4 and 5. This shows that the innovation of processing banana blossoms into dry products in the form of shredded meat is considered by partners a concrete solution to

the sensitivity problem of traditional fresh products, which quickly spoil in the field. This level of acceptance was enhanced by the third indicator, where the majority of participants, 77.8%, stated that they strongly agreed with a score of 5 that the final product of pouch packaging shredded meat they produced independently had met the appropriate quality standard specifications, had a strong taste, and was hygienic.

The smooth adoption of appropriate technology at the partner level is also significantly influenced by the managerial performance and governance efficiency of the proposing team in the field. Based on the fourth indicator, communication and team coordination were assessed as very effective by 70% of participants, who gave a maximum score of 5. In addition, the timeline for implementing activities was strictly aligned with the planned Work Breakdown Structure (WBS) schedule. The fifth indicator shows that 60% of participants assess the accuracy of the team's schedule as very good (score 5), a crucial indicator of time discipline, given that Aisyiyah's mothers have limited time between their household responsibilities. This efficiency parameter is also supported by the sixth indicator, in which aspects of resource utilization, such as logistics, hall space, and the optimization of local raw materials, achieve a cumulative satisfaction level of 90% at scores 4 and 5, indicating that program budget management is being managed accountably and efficiently. Based on risk management indicators in the field, the proposing team was assessed as alert in mitigating technical obstacles such as hall electrical conditioning, food taste stability, and spinner machine operation, with a combined satisfaction percentage of 80% for scores 4 and 5. The service governance concluded with impressive achievements in the ninth indicator, where 90% of partners agreed or strongly agreed that the Shredded Heart of Banana innovation project had a real economic benefit and high final satisfaction in increasing women's productivity in the Colomadu District.

Scientifically, the success of the service program in improving the skills of PCA Colomadu mothers is driven by the harmony between the characteristics of the raw materials and the selection of innovative processed product types. This supports the theory that the vegetative parts of banana plants have high functional value, which is not only limited to fruit morphology but can also be optimized into high-quality functional food products [5]. The visual characteristics of the outer petals, which are dark purplish brown in color, and the dimensions of the middle coil, which range from 12–25 cm, as described in the study by Sukreni & Lestari [7], have often made ordinary people think that this commodity is difficult to process into modern commercial products. However, through an interactive approach from the initial meeting, the team succeeded in conveying the understanding that behind this physical structure lies extraordinary nutritional value.

The high level of partner satisfaction with the quality of independently produced shredded products (reaching 77.8% with a very satisfactory score) chemically confirms the basic theory of Rukmana [8] regarding the inherent nutritional components of banana blossoms, which are rich in calories, protein, carbohydrates, vitamin A, water, and phosphorus. The organoleptic properties of the final product of banana flower floss, which

resembles meat fiber, originate from the high content of dietary fiber, but it has the characteristics of remaining low in fat and low in protein, which is in line with the research results of Kusumaningtyas et al. [9]. When the dominant fiber component, as shown by Angraeni et al. [10], underwent a measured longitudinal chopping and boiling process, softening the cellulose bonds in the flower petals and forming a fine woven fiber. When cooked with traditional spices and coconut milk, this fiber binds the spices tightly, producing a savory flavor reminiscent of conventional meat floss.

Critically, the adoption of appropriate technology at the oil-draining stage, using a mechanical spinner machine, is the most crucial intervention that determines high economic satisfaction among partners, reaching a cumulative figure of 90%. This field reality strongly supports the finding that fresh banana blossoms have a high water content [8], so if processed only using conventional stir-fry or lodeh methods, the product will retain a high water content and become a medium highly susceptible to the growth of spoilage microbes. Using the science and technology diffusion method, oil and water were successfully separated from the oil using a spinner machine, reducing the free water content without damaging the dietary fiber and potassium content that are dominant in it [10]. This reduction in water activity automatically extends the shelf life of shredded meat to months in airtight packaging without chemical preservatives, while also addressing the partner's problem with the sensitivity of traditional products, which spoil quickly in the field. In addition to offering a food stability solution, this product is projected to have high sales value in the suburban area of Colomadu because it offers the benefits of healthy food. These field findings are reinforced by a clinical study by Sammeng et al. [30], which found that proportional consumption of banana blossoms has been shown to provide various significant clinical benefits, including warding off free radicals, relieving menstrual pain, reduce the risk of diabetes, maintaining digestive health, overcoming infections, preventing cancer, maintaining heart health, supporting weight loss programs, and even preventing prostate enlargement. In today's modern era, awareness of healthy lifestyles among urban and suburban communities has increased dramatically.

Ultimately, all of the results of this community service program have proven to be highly consistent with and support previous empirical findings by Ristyanadi et al. [31], which confirmed that downstreaming horticultural waste into fiber-based vegetable shredded meat is not only effective in reducing food waste but also increases household income through the use of digital sales channels. Thus, the synchronization of clinical education on banana blossom nutrition with the mastery of modern packaging technology has successfully transformed the domestic role of the PCA Colomadu women into that of resilient, productive agents of the creative economy.

The results of this community service program demonstrate that innovative banana blossom processing not only produces alternative food products but also serves as an instrument for community empowerment based on local potential. From an empowerment perspective, increased partner capacity is evident in participants' ability to independently master the processes of production, packaging, and marketing. Furthermore, the active

involvement of the Colomadu PCA women at all stages of the activity demonstrates a transformation from beneficiaries to productive economic actors. This is in line with the concept of community empowerment, which positions communities as the subjects of development by strengthening individual and group capacities. From a community quality-of-life perspective, this activity has the potential to deliver sustainable impacts, including increased family income, reduced food waste, optimized use of local resources, and strengthened household food security.

Beyond the economic and technical outcomes, this program also contributes to strengthening human literacy by developing participants' social awareness, collaboration skills, empathy, and collective responsibility. Collaborative learning significantly enhances interpersonal and social competencies [32]. The participatory learning process encouraged the PCA Colomadu women to engage in mutual learning, knowledge sharing, and cooperative problem-solving, thereby fostering social capital and strengthening community cohesion. These competencies are essential components of human literacy in the twenty-first century, as they enable individuals to adapt, communicate effectively, and actively contribute to community development.

Furthermore, the program promotes civilization literacy by encouraging participants to transform local wisdom and indigenous resources into value-added products that are relevant to contemporary societal needs. The utilization of banana blossoms, which have traditionally been underutilized, reflects an awareness of sustainable resource management, food innovation, and community-based economic resilience. Through this process, participants not only acquire technical skills but also develop an understanding of how local cultural assets can be integrated with modern technology and entrepreneurship. Such awareness strengthens the community's capacity to participate in sustainable development while preserving local identity, thereby contributing to the advancement of a more resilient and civilized society [33], [34].

Beyond the technical and economic achievements, this community service program generated broader impacts on the target community. The ability of the PCA Colomadu women to independently process banana blossoms into commercially packaged shredded products has created new opportunities for household-based microenterprises, particularly for women with limited access to formal employment. Furthermore, the use of locally available banana blossoms helps reduce organic food waste while increasing the value of underutilized agricultural resources. In the long term, these outcomes are expected to strengthen household food security, improve women's economic independence, and encourage the sustainable development of community-based creative industries rooted in local resources.

The community response to this program was highly positive, as demonstrated not only by the evaluation results, in which between 80% and 100% of participants expressed satisfaction across the assessed indicators, but also by their active engagement throughout the implementation process. Participants enthusiastically took part in discussions, practical production activities, product packaging, and post-training consultations. This high level of acceptance was influenced by several factors, including the innovation's relevance to local community needs, the

simplicity of the processing techniques, the use of appropriate, easy-to-operate technology, and the participatory learning approach that encouraged collaboration and mutual support among participants. These findings indicate that the program successfully addressed community needs while fostering confidence to continue production independently.

From the implementation team's perspective, this community service program demonstrates that sustainable community empowerment requires more than technical skills training. Continuous mentoring, entrepreneurship development, and institutional support are equally important to ensure that newly acquired competencies can be maintained after the program concludes. One important lesson learned is that introducing appropriate technology becomes more effective when combined with participatory learning and business management assistance. Nevertheless, several challenges remain, including the limited duration of mentoring, the relatively small number of participants, and the need to expand market access. Therefore, future community service programs are recommended to include longer-term business incubation, product certification, branding assistance, digital marketing development, and collaboration with local government and MSME stakeholders to strengthen the sustainability of women's community enterprises.

Conclusion

The implementation of a community service program by downstreaming local commodities into Banana Heart Floss products has proven effective in empowering the Colomadu Aisyiyah Branch Leadership (PCA) Women in knowledge, skills, and managerial skills. The integration of community education methods, diffusion of science and technology in the form of a mechanical spinner machine, and modern packaging training (100 gram standing pouch) has successfully transformed Kepok banana hearts, which were initially susceptible to spoilage (food waste), into a dry functional food product with high economic value that is crispy, hygienic, and has a long shelf life. The success rate of this program is supported by very impressive quantitative evaluation results, with positive responses from partners ranging from 80% to 100% across goal achievement, the proposing team's communication effectiveness, resource efficiency, and the sustainability of family financial impacts. Theoretically and clinically, this product innovation has not only addressed the constraints posed by the shelf-life sensitivity of traditional food products in suburban areas but has also realized the dominant nutritional potential of banana heart fiber and potassium, resulting in a healthy food product that is adaptive to modern market trends. Thus, synchronizing mastery of independent food-processing technology has empirically shifted women's domestic roles toward productive agency in a resilient, independent creative economy, thereby supporting household financial resilience. In addition to generating innovative local food products, this program has broader social impacts, including increased women's empowerment, strengthened family economic capacity, and the optimization of previously underutilized local resources. These findings demonstrate that the development of banana blossom floss products is highly relevant to efforts to improve community livelihoods by strengthening food security, reducing organic waste, and developing a

sustainable, community-based creative economy. The high level of community acceptance, reflected in active participation throughout the training activities and partner satisfaction levels of 80–100%, indicates that the program successfully addressed the real needs of the target community and encouraged participants to continue applying the acquired knowledge and skills independently. Furthermore, the implementation of this project demonstrated that combining participatory learning, appropriate technology, and continuous mentoring constitutes an effective strategy for sustainable community empowerment. Future community service initiatives are therefore recommended to strengthen long-term business mentoring, expand digital marketing support, and establish collaborations with local government and MSME stakeholders to enhance the sustainability and scalability of community-based enterprises.

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