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Utilization of Fish Skin Waste for Enhancing Knowledge and Skills of Homemakers in Talang Keramat Village

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Abstract

This community service in Talang Keramat Village, South Sumatra, Indonesia, aimed to empower homemakers by valorising fish skin waste. The primary objective was to promote its use in processed food to improve nutrition and economic prospects. The project specifically sought to: (1) enhance understanding of fish skin's potential as a raw material for nutritious and economically viable food; (2) demonstrate practical methods for processing fish skin into food products; and (3) shift community perception regarding the benefits of utilizing fish skin waste. A descriptive qualitative approach was employed, with implementation in three phases: pre- and post-test questionnaires to assess comprehension; educational material on transforming fish skin waste; and a demonstration of processed food preparation. Sixteen homemakers participated in the one-day activity. Results showed that 75.00% understood the nutritional and economic value of fish skin waste, 81.25% could explain processing methods, and 87.50% showed improved understanding of its benefits. In conclusion, this community service successfully empowered homemakers with the knowledge and skills to convert fish waste into valuable food products, contributing to nutritional enhancement and economic empowerment within the community.

A. Introduction

Fisheries byproducts, frequently regarded as valueless remnants of the fishing industry, in fact hold substantial untapped potential. The fisheries sector, as a continuously expanding food industry, generates a considerable volume of waste, notably from underutilized portions of fish such as the fish skin. From an environmental and sustainability standpoint, neglecting to utilize this waste is an imprudent choice, particularly when considering the prevailing global energy and ecological challenges. Improper handling and storage of this waste can lead to nutrient loss (Munaeni et al., 2024), and environmental contamination such as water and air pollution (Juliansyah, 2023).

This community service was conducted in Banyuasin Regency, located in South Sumatra Province, since the region possesses significant fishery and marine resource potential. With a coastline stretching 275 km, a sea area of 1,765 km², and a potential production of approximately 102,300 tons per year, Banyuasin Regency holds considerable promise in the fisheries sector, encompassing capture fisheries, aquaculture, and processed fishery products. In the year 2023, the capture fisheries and aquaculture production of snakehead fish (*Channa striata*) amounted to 1,140 metric tons and 1 metric ton, respectively. The

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production volume of processed marine and fishery products reached 24.04 tons in 2023 (Septifitri, 2024). These processing activities generate fisheries waste, including fish skin, which, with appropriate handling, can be transformed into value-added products with economic benefits. Therefore, the management of production fish skin waste at the level of small-scale entrepreneurs and household industries is imperative to mitigate adverse environmental impacts and to unlock the potential of underutilized resources such as fish skin (Pędziwiatr et al., 2017).

Previous research findings indicate that the moisture content, protein content, fat content, and ash content of snakehead fish (*Channa striata*) skin were 77.18%, 20.36%, 1.42%, and 0.67%, respectively (Wulandari et al., 2015). Despite its potential as a nutritionally and economically valuable food ingredient, fish skin is often discarded. However, prior research indicates that fish skin can be processed into various high-value products, such as gelatine (Pakalla et al., 2024), collagen, antimicrobial compounds (Jimenez-Champi et al., 2024), chitosan, collagen nanofibers (Coppola et al., 2021), and even unique souvenirs (Sari & Arief, 2018).

Nevertheless, educational and training programs focused on fish skin processing remain limited, particularly among homemakers. Previous community service that had been documented was processed stingray skin into crackers (Sunaryo, 2019). Therefore, this community service aims to empower homemakers residing in Talang Keramat Village, Talang Kelapa Subdistrict, Banyuasin Regency, South Sumatra by valorising fish skin waste regarding the processing of fish skin waste into nutritionally and economically valuable food products. This activity was expected to enhance the community's proficiency in managing household industry waste and add value to fishery resources.

The primary objective of this community service was to promote fish skin waste use in processed food to improve nutrition and economic prospects. The project specifically sought to: (1) Enhance understanding of fish skin's potential as a raw material for nutritious and economically viable food; (2) Demonstrate practical methods for processing fish skin into food products; and (3) Shift community perception regarding the benefits of utilizing fish skin waste.

The benefits of this community service for homemakers, namely: (1) Increased potential for income generation: By acquiring knowledge and skills in processing fish skin waste into nutritious and economically valuable food products, homemakers can create new opportunities for income generation through small-scale enterprises. This can contribute to improved household financial stability and economic empowerment within the community, and (2) Enhanced skills for sustainable resource management: The program will equip homemakers with innovative skills in processing fish skin waste, transforming what is typically discarded into valuable resources. This promotes a more sustainable approach to managing fishery byproducts, reducing environmental burden and fostering a culture of resourcefulness within the community.

The intended participants of this community service were the collective of homemakers living in Talang Keramat Village. This group can be further differentiated based on their present economic engagement and future ambitions, namely (1) Homemakers currently generating income: This subset includes women who are already involved in activities that produce earnings, potentially through small-scale food production or other home-based ventures. For these individuals, the program presents a chance to broaden their product range by using fish skin waste, which could lead to increased earnings and a wider market through novel and higher-value goods. The instruction offered can equip them with new abilities and understanding to improve their current businesses and utilize a readily accessible local material, (2) Homemakers not currently generating income but aspiring to entrepreneurship: This subset consists of women who are presently not involved in income-generating work but have a desire to establish their own businesses. The program offers them a practical starting point by providing instruction in a specific skill – the processing of fish skin waste – and the potential to develop products for sale. This initiative can enable them to achieve financial independence, contributing to their family's finances and overall welfare. The program addresses their need for skill development and a feasible business opportunity utilizing local resources, and (3) Homemakers not currently generating income: This subset includes women who may not presently have entrepreneurial goals but can still gain from the program. Learning how to process fish skin waste for their own household use or for small-scale local sharing can improve their family's nutrition and potentially decrease waste within their community. Moreover, being introduced to entrepreneurial activities might stimulate new interests and future income-generating possibilities. The program addresses their need for skill improvement and the promotion of environmentally sound practices within their homes.

The scientific innovation of this community service program lies in its novel application of snakehead (*Channa striata*) fish skin waste, an economically underutilized resource, as the primary material for food processing. This initiative introduces specialized processing techniques tailored to transform this waste into edible products, namely fish skin nugget and crispy fish skin. By focusing on this unexploited resource and employing specific processing methods to generate products with distinct characteristics, this program presents a scientifically innovative approach within community service. Furthermore, this program emphasizes a participatory approach, directly engaging homemakers in the training and mentorship process.

The primary challenge is the limited knowledge and skills of the community, particularly homemakers, in processing fish skin waste into nutritionally and economically viable food products. The hypothesis of this program is that through educational outreach and practical training, the community's proficiency in fish skin waste processing will significantly improve.

B. Methods

A descriptive qualitative approach was employed, with implementation in three phases: pre-test and post-test questionnaires to assess comprehension; educational material on transforming fish skin waste; and a demonstration of processed food preparation. The subjects of this community service were 16 homemakers residing in Talang Keramat Village.

Instrument

The instruments used for this community service were pre-test and post-test questionnaires. This activity was completed within a one-day timeframe (Dewiyeti et al., 2024).

Form of Community Service

This community service was delivered through a combination of lecture, discussion, and demonstration methods. The primary material focuses on fish skin's potential as a raw material for nutritious and economically viable food. The activity was complemented by intensive guidance services, where communication between the community service team and the homemakers is fostered to ensure the effectiveness and efficiency of the implementation.

Lecturers demonstrated the step-by-step processing of products, namely: (1) Fish skin nuggets: Demonstrating the mixing of ground snakehead fish skin with binders (wheat flour, chicken egg), seasonings (salt, garlic, pepper), shaping, steaming, coating (wheat flour, breadcrumb) and frying; (2) Crispy fish skin: Demonstrating the preparation of thin slices of pre-treated snakehead fish skin, seasoning with salt, garlic and pepper, and the frying process to achieve a crispy texture. The demonstrations were conducted using essential cooking equipment such as knives, cutting board, grinder, stoves, pans, spatulas, plates, basins, and steamers. The raw materials included snakehead fish skin, along with supporting ingredients like drink water, wheat flour, cooking oil, breadcrumbs, chicken eggs, salt, and spices such as garlic and pepper.

Implementation Process

The implementation of this activity includes an effective process evaluation. The evaluation was conducted by observing and assessing participant engagement during the material delivery. The participants' commitment to using their time for guidance was demonstrated by their active and intensive communication with the community service team. The evaluation process demonstrated its effectiveness in the participants' understanding of the implementation of this activity includes an effective process evaluation. The evaluation was conducted by observing and assessing participant engagement during the material delivery. The participants' commitment to using their time for guidance was demonstrated by their active and intensive communication with the community service team. The effectiveness of the evaluation process was reflected in the participants' understanding on fish skin's potential as a raw material for nutritious and economically viable food.

C. Results and Discussion

Community service with the theme "Utilization of Fish Skin Waste for Enhancing Knowledge and Skills of Homemakers in Talang Keramat Village" was be held in Jalan Talang Keramat Lorong A. Gofar RT 16 RW 03, Talang Keramat Village, Talang Kelapa Subdistrict, Banyuasin Regency, South Sumatra, on

Friday, July 22, 2022. The event was involved 16 participants. During the activity, all participants demonstrated high enthusiasm and support.

1). Providing Understanding about Fish Skin Potency

The results indicate that 75.00% of participants understood the nutritional and economic value of fish skin waste. The material covered six themes, including: (1) Utilization of fish waste as functional food, (2) Promotion of fish consumption and processed fishery products for enhanced child health and cognitive development, (3) Application of fish skin waste in Palembang-specific food processing, (4) Business opportunities in crispy fish skin production and business analysis, (5) Utilization of fish skin waste to produce collagen-rich crispy fish skin snacks, and (6) Utilization of snakehead fish skin waste to produce crispy fish skin. The delivering material by lecturers of Faculty of Fisheries and Marine Science, University of PGRI Palembang was illustrated in Figure 1. Community service activities aimed at increasing public awareness regarding the benefits of fish and its processed products for community health have also been conducted previously (Nasyiruddin et al., 2024).

Figure 1. Presentation of Community Service Material by Lecturers

2). Demonstration the Method of Processing Fish Skin into Food Products

Approximately 81.25% of the homemakers showed comprehended of preparing products method. A demonstration activity of the processing of snakehead fish skin into fish skin nugget and crispy fish skin was illustrated in Figure 2. The participants showed significant enthusiasm for the product demonstration through active observation, questioning, and tasting of the products. The enthusiasm of the community towards the fish-based food processing training aligns with previous community service activities (Hafid et al., 2024; Sari & Irianto, 2023).

Figure 2. Demonstration of Product Processing by Lecturers and Students

3). Shift Community Perception Regarding the Benefits of Utilizing Fish Skin Waste

A total of 87.50% of participants reported a shift in their mindset regarding the fish skin waste. This shift was facilitated by the explanation of the understanding that fish skin contains beneficial nutrients for health, that it can be processed into food products, and that these derived food products possess economic value and are marketable. By adopting this mindset, fish skin waste can be processed into food, thereby mitigating the environmental damage caused by fish waste in Talang Kelapa Village. The community service team's material presentation elicited clear enthusiasm from the participants, demonstrated by their active involvement and sincere interest in the topic.

Figure 3. Evaluation of Activity Outcomes through a Question-and-Answer Involving Lecturers and Participants

Figure 4. Participants of the Community Service

While beneficial for participants, this community service activity has a key limitation, namely insufficient time to evaluate its long-term impact on the participating community. Given that long-term impact is the ultimate program outcome (Wijayanto & Prasetyo, 2018), future training schemes should include this evaluation.

D. Conclusion

The conclusions drawn from the community service highlight the significant impact of the initiative, titled "Utilization of Fish Skin Waste for Enhancing Knowledge and Skills of Homemakers in Talang Keramat Village, Talang Kelapa Subdistrict, Banyuasin Regency." This program has provided the local homemakers with valuable knowledge and skills insights into utilization of fish skin waste. It offered practical solutions for addressing the use of fish skin as material ingredient to produce nutritional and economic value products.

Furthermore, this activity has inspired and motivated the homemakers to be involved in activities that produce earnings, potentially through small-scale food production of fish skin waste. To further enhance the impact of this approach, several recommendations have been proposed, including the need for continued the education and food processed training of fish skin waste.

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