

Diversification of Seaweed and Milkfish Processing in Improving the Economy of Coastal Community Families

Marhawati Najib^{1*}, Sri Astuty¹, Wahyu Hidayat¹, Irwandi¹, Hikmayani Subur¹, and Nur'aeni²

¹Pendidikan Ekonomi, Fakultas Ekonomi dan Bisnis, Universitas Negeri Makassar, Makassar, Indonesia

²Ekonomi Pembangunan, Fakultas Ekonomi dan Bisnis, Universitas Negeri Makassar, Makassar, Indonesia

³Pendidikan Teknik Informatika dan Komputer, Fakultas Teknik, Universitas Negeri Makassar, Indonesia

⁴Manajemen, Fakultas Ekonomi dan Bisnis, Universitas Pelita Bangsa, Bekasi, Indonesia
*marhawati@unm.ac.id

Article Info	Abstract
Article history: Received: September 16, 2024 Accepted: November 25, 2024 Published: March 18, 2025 Keywords: Diversification Marketing Milkfish Processing Seaweed This article is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License © 2025 Bubungan Tinggi: Jurnal Pengabdian Masyarakat	The purpose of this community service is to empower housewives by providing training on how to process seaweed, which is rich in nutrients and a source of protein, into products with high economic value. Through socialization, instruction, hands-on practice, and mentorship, content is provided through the Participatory Learning and Action (PLA) approach. The findings are that most housewives are unemployed and have a lot of free time not used for productive activities due to the lack of knowledge and skills in processing seaweed. The results of implementing this community service are an increase in knowledge and skills by 98% in processing seaweed combined with milkfish into products with economic value in the form of mini pastels, meatballs, and nuggets. Product marketing training activities: by practicing using online media, only eight people (20%) can understand how to use social media well. The rest of the participants do not have an Android cellphone, and some have cellphones but do not understand how to use social media. In addition, there are also obstacles to understanding technology, especially among older people or those less familiar with digital devices. This seaweed processing and marketing activity is expected to provide added value to seaweed commodities and provide additional income for seaweed farming families.
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INTRODUCTION

As an archipelagic country, Indonesia, with a coastline of 81,000 kilometers, has abundant and diverse natural resources in its coastal and marine areas. These diverse natural resources have enormous potential to be developed as new drivers of economic growth (Ridwan, 2012). Seaweed is a leading commodity in the fisheries sector that has the potential to be utilized in Indonesian waters (Rahadiati, et al., 2018). Increasing seaweed production is one way to boost the local economies of coastal towns. Coastal communities in Indonesia are highly dependent on traditional fishing catches to survive. Along with the

increasing population and fishing activities, alternative sources of income are becoming increasingly important, so seaweed cultivation is carried out in various regions ([Marhawati et al., 2020](#)).

One of the main seaweed-producing areas in Indonesia is South Sulawesi. Based on data from the Ministry of Maritime Affairs and Fisheries (KKP) in 2022, South Sulawesi contributed 3.79 million tons or 41.55% of the total national seaweed production in Indonesia, making it the largest producing area ([Pashar & Amir, 2023](#)). The total area utilized for seaweed production is 193,700 hectares at sea and 32,000 hectares in ponds. The total production reached 785,306 tons, consisting of 465,306 tons of *Eucheuma cottonii* and 320,000 tons of *Gracilaria verrucosa*. However, this potential has only been realized around 10% ([Ridwan, 2012](#)).

In addition to being an important marine commodity in international trade, seaweed provides income for coastal communities and is one of the main sources of foreign exchange ([Badarudin, 2018](#)). Seaweed contains many nutrients and can be developed as a food product ([Erniati et al., 2016](#); [Fitrianti et al., 2023](#)). Seaweed has protective chemical compounds that function as antioxidants, including phenol compounds, dietary fiber, PUFA, and photosynthetic pigments. These compounds benefit human health and can be functional foods ([Sanger, 2018](#)).

Pangkep Regency has a long water area and coastline in South Sulawesi. The length of the coastline on the mainland is 42.57 km, while the length of the coastline for the archipelago is 63.57 km ([BPS, 2018](#); [Director General of PRL KKP, 2019](#); [DKP Kab. Pangkep, 2011](#)). The sea area of Pangkep Regency is 71,000 km², and the area of small islands is 35,150 ha. It has a coral reef area of around 36,000 ha and a coastline length of 250 km ([Mahendradatta et al., 2023](#); [Marhawati et al., 2020](#); [Samudra et al., 2012](#)). The potential of this area makes Pangkep Regency one of the areas for developing seaweed cultivation in South Sulawesi ([Litaay et al., 2023](#)). The community is very interested in seaweed cultivation because of its simple technology, easy maintenance, and sufficient market availability. In addition, seaweed also contains bioactive compounds that are beneficial for health ([Somala, 2002](#)). Seaweed has important value in several industries, such as food, cosmetics, medicine, textiles, and agriculture, because it contains agar concentrate, carrageenan, and algin ([Safia et al., 2020](#)).

Pitue Village is one of ten villages/sub-districts in Ma'rang District, Pangkajene, and Kepulauan Regency, with an area of ± 565 ha and a distance of ± 17 km from the center of government. The population is 2,727 people, and 373 people work as fishermen/seaweed farmers. Seaweed cultivation begins with tying seeds to a rope 50 to 100 meters long, then stretched on the water's surface. Like most villages located on the coast with a flat landscape and a height of two meters above sea level, the livelihoods of most residents of Pitue Village are pond farmers, fishermen, and seaweed farmers. The type of seaweed cultivated by farmers is *Eucheuma Cottonii*. Seaweed harvesting is usually carried out around the age of 6-8 weeks after planting or around 45 days. After harvesting, it is dried for 3 or 4 days, depending on the weather. Sometimes, farmers sell seaweed in wet form if they are economically desperate to meet their living needs.

Currently, seaweed farmers are worried about the unstable selling price of seaweed in the market. The seaweed market is controlled by collectors and wholesalers, so prices at the farmer level are low. Farmers have not carried out processing activities as a business opportunity and job opportunity for coastal communities. Another problem is that housewives only have activities when tying seaweed seeds to the rope. They get a wage of Rp. 4,000 for one rope that is 15 meters long, as in Figure 1.



Figure 1 Tying seaweed to a stretch rope

After that, the activities of housewives are empty because they are not involved in the maintenance and harvest period. Therefore, there is a lot of free time that housewives do not use for productive activities. The fishing community in Pitue Village has below-average income. Most fishing families depend only on their husbands' income, and the fishermen's wives only carry out their duties as wives without being able to earn income. Housewives spend more time at home, sometimes feeling bored or fed up. They expect to have activities and activities that can be useful for the welfare of their families. Still, they have never received training or gained knowledge about how to process seaweed which is rich in nutrition and a source of protein, into products with high economic value.

Facing such problems, we offer a solution with technological innovation, namely the processing of seaweed into products that have a selling value. This seaweed processing activity is expected to provide added value to seaweed commodities and provide additional income for seaweed farming families. Added value is the increase in the value of a commodity because it undergoes a processing, transportation, or storage process in production ([Saragih, 2009](#)). Diversification of food products can be done by processing various variations ([Sumastuti, 2009](#)). With product diversification, it can increase sales enthusiasm and become an added value to a business.

So far, seaweed has only been processed in the form of dodol, so to empower coastal communities, especially housewives who are seaweed farmers in Pitue Village, by providing knowledge and skills and building an entrepreneurial spirit in processing seaweed into products that can be developed on a home industry scale, namely mini seaweed pastels filled with milkfish floss, nuggets, and seaweed meatballs. Mini seaweed pastels, meatballs, and nuggets use milkfish as an additional ingredient in making these products, considering that some farmers who manage seaweed farming businesses have their primary jobs as milkfish pond farmers.

The processed seaweed products are then marketed using a digital platform. The use of information technology plays an important role in advancing the marketing of processed seaweed, as well as playing a role in increasing knowledge about modern marketing techniques ([Panorama & Muhajirin, 2017](#)). With increased access and the ability to use digital technology, business actors can access a wider market through online platforms such as social media, websites, and mobile applications ([Tahir et al., 2021](#)). Therefore, this community service activity aims to assist partners in solving problems in seaweed processing and marketing problems that focus on improving partner skills and income.

METHODS

This community service activity took place in the Baruga Sayang building, Pitue Village, which 40 people attended. Participants were housewives who were members of the PKK Working Group led by Mrs. Nurlina. The implementation time was August 9, 2024. A Participatory Learning and Action (PLA) strategy is used with mentorship and hands-on

training to address partner concerns ([Marhawati et al., 2019](#)). Participatory Learning and Action (PLA) is a concept that, in theory, successfully highlights the learning process. According to [Darmawan et al. \(2020\)](#), learning activities are developed with community involvement in mind, including them in all stages of development, execution, and assessment. Based on the problems faced by the partners, the solutions offered as a method in implementing this community service activity include providing counseling and training on making mini pastels, nuggets, and meatballs whose basic ingredients are seaweed and combined with milkfish meat. The stages of the activities carried out include:

Preparation Stage

The preparation stage involves submitting a letter of service permit from Makassar State University, coordinating with the Head of Pitue Village and partners to discuss the time and technical implementation of the activity, and preparing the tools and materials to be used.

Implementation Stage

At this stage, activities are carried out by providing counseling/delivering material on processing wet and dry seaweed, discussions, questions and answers, and practice. The implementation stage is divided into several activities, namely:

- Practice making mini pastel products, meatballs, and seaweed nuggets combined with milkfish meat.
- Practice making a website and promoting and marketing products using a digital platform.

Evaluation Stage

This evaluation stage is carried out to evaluate the results of the activities of the PKK Working Group women in making mini pastels, nuggets, and meatballs and evaluating the use of digital media in marketing their products.

RESULTS AND DISCUSSION

Results of Community Service Implementation

This activity starts with training preparation by preparing raw materials and equipment that will be used in the activity. The village head, Muhammad Nasrul, opened the initial stage of the implementation by motivating the housewives of his village to want to learn and improve their knowledge and skills in processing seaweed so that it could be used as additional family income, as in Figure 2.



Figure 2 Village head's speech

In her lecture, Dr. Ir. Hj. Marhawati, M. Si, Head of the Community Service Team, stressed the benefits of processing items to give seaweed commodities more value (benefits Added) instead of unprocessed (Figure 3). Seaweed growers who are also

housewives can contribute to the family income by harnessing the possibilities of their local area ([Setyawati & Ningrum, 2018](#)).



Figure 3 Team leader's welcome

The following activities were carried out by the service team, including:

Product making training

The initial stage of implementing the PKM activity was to conduct a pretest to determine the initial ability level of the activity participants, namely the ability to process seaweed combined with milkfish meat into mini pastel products, meatballs, and nuggets. The pretest results from 40 participants were 25 people, or 63%, who knew how to process grass into mini pastel products, meatballs, and nuggets. On average, the women only knew that seaweed can usually be processed into meatballs and nuggets without using milkfish meat.

Because coastal villages cultivate milkfish in ponds in addition to seaweed, milkfish is used as an extra component in these three items. Additionally, milkfish is highly sought after and devoured by the public due to its flavorful, savory taste and the fact that its meat is packed with nutrients, including protein, carbs, fat, minerals, vitamins, and water ([Ernaningsih et al., 2023](#); [Hafiludin, 2015](#)). According to the new participants, mini pastels are made using milkfish meat floss filling and pastel skin using seaweed powder. The training participants are in the following Figure 4.



Figure 4 Participants listen to a lecture

Mini Pastel-making Training

For pastel skin, mix 200 grams of seaweed powder with 300 grams of wheat flour, 1 teaspoon of salt, and 3 tablespoons of cooking oil, then stir well and pour enough water so that it becomes a dough ready to be rolled. For the filling: Clean the milkfish then grill it to reduce the water content of the milkfish. Clean the fish meat by removing the bones and spines, and shredding the fish meat into fine pieces. After that, grind the red chili, garlic, shallots, and coriander. Saute the spices until fragrant; add lemongrass,

crushed galangal, and bay leaves, and add seasoned salt, brown sugar, and tamarind water. Add the shredded fish meat then fry until dry.

How to Make: Flatten the skin dough using a roll, then mold and fill with fish floss. Close by twisting the ends of the pastel, and it is ready to be fried. This can be seen in Figure 5.



Figure 5 Mini pastel-making practice

Meatball-making Training

How to make: Mix 300 grams of wet seaweed that has been soaked for 3 hours to remove the smell and dirt with 250 grams of milkfish meat that has been cleaned of bones and spines. Put it in a blender with pepper seasoning, fried garlic, fried shallots, salt, seasoning, and 3 egg whites. Once smooth, mix with 500 grams of tapioca flour. The meatball dough is then rounded and put into hot water. After all the dough is finished, cook until the meatballs float. This can be seen in Figure 6.



Figure 6 Meatball making practice

Nugget Making Training

Making nuggets is the same as making meatballs, only the dough is added with coconut milk so that it is savory. Then, it is steamed in a tray. After cooling, it is cut into pieces according to taste. Then, make a dipping dough, roll it in breadcrumbs, and it is ready to be fried.

Product marketing training

This product marketing training is conducted so that housewives can sell their products using online media. In this session, the significance of this training is elucidated to augment the community's knowledge and proficiency in digital platform product marketing ([Qomar et al., 2022](#); [Ramadhanty et al., 2021](#); [Sholawati et al., 2020](#); [Suhartati et al., 2021](#)) (see Figure 7). With online media, it is hoped that housewives/business owners will be able to increase their sales volume and profits, thereby providing additional income for their families.



Figure 7 Marketing practices using Android phones.

Training materials can include introduction to the internet, use of social media platforms, creation of interesting digital content, branding techniques, and management of small-scale businesses ([Marhawati et al., 2023](#)). After the presentation of the material and discussion, the next step is to implement learning activities by practicing the use of social media features such as Facebook, Instagram, and TikTok which are directly integrated with Android devices so that they are more practical. The stages of digital marketing socialization provided to partners are as follows:

- a. Mapping initial understanding related to digital marketing by
 - Visiting menti.com to conduct a limited survey simulation
 - Measuring the initial understanding of community service participants, by providing a list of questions
 - Do you already have a Facebook, Instagram, TikTok account
 - How long have you been playing Facebook, Instagram, TikTok
- b. Practicing creating a marketing account for processed seaweed products
 - Creating an email account for processed seaweed products
 - Creating Facebook, Instagram, Shoppe and TikTok accounts
- c. Tips and tricks for uploading videos and captions to e-commerce accounts.

Several trainings on making processed seaweed products have been conducted ([Sukaryani et al., 2021](#)), combining seaweed with laying hen meat into nuggets and meatballs. This training focused on Posyandu Mawar to improve the nutrition of toddlers and elderly parents. Meanwhile, the training conducted by ([Fitrianti et al., 2023](#)) processed seaweed into chips, sushi, antibacterial soap, and seaweed cultivation in Takalar Regency. This training did not explain how to make chips, sushi, and soap, but rather focused on how to cultivate seaweed to increase production.

Our training provides skills in processing seaweed by combining it with milkfish meat to create mini pastels, meatballs, and nuggets ready to sell. In addition, participants are given skills training in marketing using online media to widen their marketing reach and increase household income.

Evaluation of Community Service Activities

After the community service activities are completed, an evaluation is carried out to determine the extent to which the women's skills are in processing seaweed into products with economic value, namely mini pastels, meatballs, and nuggets. The evaluation also evaluates the women's understanding and skills in using online media to market their products. The evaluation results show that after the training activities, the participants

are skilled in processing seaweed into products with high sales value, such as mini pastels, meatballs, and seaweed.

Implementing community service activities is inseparable from supporting and inhibiting factors. Factors that support the implementation of this activity are the high enthusiasm of the PKK women for participating in training activities and the motivation of the Village Head to his residents to always want to learn and improve their knowledge and skills in processing seaweed into products of economic value.

The inhibiting factors of this activity in marketing practices using online media are only a few participants who can and understand how to use social media properly. The rest of the participants do not have an Android cellphone, and some have cellphones but do not understand how to use social media. Several challenges need to be overcome in empowering communities through digital literacy. First, access to digital infrastructure is still not evenly distributed throughout the region; some parts of Pitue Village face limitations in accessing the internet. In addition, there are also obstacles in terms of understanding technology, especially among those who are older or less familiar with digital devices.

CONCLUSION

Community service activities for diversification of processed and marketing seaweed in the PKK women's group in Pitue Village, Ma'rang District, Pangkep Regency have been carried out well and smoothly and can be concluded as follows: (1) Counseling and training activities for making mini pastels, meatballs, and nuggets combined with milkfish meat have been carried out well and smoothly. The 40 women who participated were active and enthusiastic in participating in the activities, from counseling to practice. In the process of turning seaweed into economically valuable items like meatballs, nuggets, and tiny pastels, there was a 98% gain in knowledge and proficiency. This seaweed processing activity is expected to provide added value to seaweed commodities and provide additional income for seaweed farming families; and (2) Product marketing training activities: By practicing using online media, only 8 people (20%) can understand how to use social media well. The rest are participants who do not have an Android cellphone, and some have cellphones but do not understand how to use social media. In addition, there are obstacles in terms of understanding technology, especially among those who are older or less familiar with digital devices.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

The contributions of each author in this article are: Conceptualization, MN; methodology, SA and NR; writing and drafting, WH and IR; formal analysis, HS.

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Entrepreneurship and Innovation, 2(1), 2721–8287.
<https://doi.org/10.31960/ijoei.v2i1.1038>

AUTHOR PROFILES



Full name : Dr. Ir. Hj. Marhawati, M.Si
Email : marhawati@unm.ac.id
Expertise : Socio-Economic Agriculture, Agribusiness
Affiliation : Universitas Negeri Makassar
<https://scholar.google.com/citations?user=Cu0UHjUAAAAJ&hl=id>
<https://sinta.kemdikbud.go.id/profile/6698105>
<http://orcid.org/0000-0003-3243-6864>
<https://www.scopus.com/authid/detail.uri?authorId=58737992400>



Full name : Dr. Sri Astuty, M.Si
Email : Sri.astuty@unm.ac.id
Expertise : Resource economics
Affiliation : Universitas Negeri Makassar
https://scholar.google.com/citations?view_op=list_works&hl=id&user=4kgjQGYAAAAJ
<https://sinta.kemdikbud.go.id/authors/profile/6173765>
<https://orcid.org/0000-0003-4088-4843>



Full name : Wahyu Hidayat M, S. Pd., M. Pd
Email : wahyu.hidayat@unm.ac.id
Expertise: Technology education, Computer education, Vocational education, Innovation technology
Affiliation : Universitas Negeri Makassar
https://scholar.google.com/citations?user=E_X_4QAAAAAJ&hl=id
Sinta :6793211
<https://orcid.org/my-orcid?orcid=0000-0002-7751-0143>
<https://www.scopus.com/authid/detail.uri?authorId=59232497100>



Full name : Irwandi, S. Pd., M.Sc
Email : irwandi@unm.ac.id
Expertise : Development economics
Affiliation : Universitas Negeri Makassar
<https://www.scopus.com/authid/detail.uri?authorId=58546257800>
<https://sinta.kemdikbud.go.id/authors/profile/6812628>
<https://orcid.org/0000-0001-9544-3725>
<https://www.scopus.com/authid/detail.uri?authorId=58546257800>



Full name : Hikmayani Subur, S.Pd., M.Pd.
Email : hikmayani.subur@unm.ac.id
Expertise : Accounting Economics Education
Affiliation : Universitas Negeri Makassar
<https://scholar.google.com/citations?user=aR66P0IAAAAJ&hl=id>
<https://sinta.kemdikbud.go.id/authors/profile/6890746>
<https://orcid.org/0009-0005-6167-2163>



Full name : Dr. Nur'Aeni., S.E., M.Si

Email : nur.aeni@pelitabangsa.ac.id

Expertise : Economic Management

Affiliation : Universitas Pelita Bangsa

<https://scholar.google.com/citations?user=1QWJblQAAAAJ&hl=id&oi=sra>

<https://sinta.kemdikbud.go.id/6753270>

<http://orcid.org/0009-0006-1929-6317>