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## **Production Jelly Candy and Soap Derived from Marine Seaweed for Health Branding and Community Empowerment in Mojokerto**

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### **Abstract:**

In food ingredients, seaweed can be formulated into jelly candy that is in great demand from children to adults. In pharmaceutical grade, it can be formulated into cosmetics such as natural soap. Some of the things planned by the PKM team are innovating seaweed to be jelly candy and natural soap. The purpose of this activity is to provide knowledge and understanding of the diversification of processed seaweed products for both food and non-food purposes, which is expected to provide benefits in terms of increasing the added value of seaweed, awareness of hand washing hygiene, empowering women and at the same time increasing community income. This activity was realized with an approach in the form of making a sustainable cooperation program until the end of PKM, creating a family atmosphere between the two and understanding that the problems experienced were a shared problem so that they could be solved together according to the level of responsibility to achieve the expected benefits, namely increased yields, production and productivity and competitiveness, independence and welfare of the community.

**Keywords:** Women Empowerment, Health Care, Seaweed, Social Welfare, Food Diversification

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### **Introduction**

Seaweed is one of the main fishery commodities in Indonesia. Its production continues to increase every year with an average increase of 22.25% per year. The Ministry of Marine Affairs and Fisheries strengthens Indonesia's position as a major player in the world's seaweed industry. In three years, the government has set a 45% increase in seaweed production. The increase in seaweed production was 10.6 million wet tons in 2015, 11.1 million wet tons in 2016, 13.4 million tons in 2017 (Kementerian Kelautan dan Perikanan, 2017). Red seaweed is very abundant in Indonesian waters and this type of seaweed has a high nutritional content, including: protein (2.6%); fat (0.4%); carbohydrates (5.70%); crude fiber (0.90%); minerals (Ca 2.30 ppm), Vitamin C (12%) (Badan Pengkajian dan Penerapan Teknologi, 2011), so it has great potential to be developed into various healthy food and non-food products (health soap). Diversification activities that have been carried out to increase selling prices are limited to food products. Making seaweed soap is an opportunity to improve community welfare.

The use of seaweed then developed as a raw material for the food, cosmetics, pharmaceutical, medical, and other industries (Kadi, 2004). One of the uses of seaweed in the food sector is jelly candy. Jelly candy is one of the products that is in great demand by the public because of its different texture compared to other candies. Jelly candy has a chewy and elastic texture. One of the factors that affects the quality of jelly candy is the presence of gelling agents. Strong gel and chewy texture in jelly candy can be produced by adding ingredients containing gelling agents. The thickener commonly used in jelly candy is carrageenan from red seaweed (Wariyat and Faridah, 2006).

On the other hand, the form of utilization of seaweed in the cosmetic sector is soap. Bath soap is a product produced from the reaction between oil or fat with KOH or NaOH base. The types of soap that are widely known are solid soap (bars) and liquid soap (Hambali et al. 2005). Washing hands with soap is one of the sanitation measures by cleaning hands and fingers using water and soap so that they are clean. Washing hands with soap is a simple, easy, and useful way to prevent various diseases that cause death, if applied correctly it can prevent diseases such as diarrhea and ARI which are often the cause of death in children, even the covid-19 virus can be prevented by washing hands. The importance of cultivating washing hands with soap properly and correctly is also supported by the World Health Organization (WHO) this can be seen by the commemoration of World Handwashing Day with Soap every October 15 (Natsir, 2018).

With so many processed materials that can be produced by seaweed, it would be better if the seaweed was processed first rather than directly exported abroad. Because of the potential and diversity of derivative products from seaweed, community empowerment in producing and especially processing seaweed products is very necessary. So that with the formation of a seaweed processing industry into derivative products, it is expected to provide additional impacts such as the availability of jobs and increased diversification of food and non-food in Indonesia (Hariyadi, 2014).

The prospect of seaweed soap business is a very promising business. First, when viewed from the aspect of product excellence, soap products are made by adding natural seaweed ingredients that have antibacterial properties. Second, Mojokerto Regency, seen from its geographical position, is an area with potential for industrial development due to the ease of access to export-import transportation because it is close to air transportation access (Juanda Airport) and sea (Tanjung Perak Port) as well as land access, namely the Sumo Toll Road (Surabaya - Mojokerto). In addition, Mojokerto Regency has various local tourism that allows many visiting guests to enjoy the natural beauty and look for local souvenirs. This is of course a great opportunity to promote and market jelly candy and seaweed soap products. The rate of economic growth in the Mojokerto Regency Region is projected to increase and become more active until 2022. The economic conditions of the Mojokerto Regency Region contributed 12.1% to Indonesia's economic growth performance despite the global economic recession and subsequent slowdown in Indonesia. Mojokerto Regency is one of the regencies

in East Java Province, where the total area is 969,360 km<sup>2</sup> or around 2.09% of the area of East Java Province.

Based on the Strategic Plan of the Mojokerto Regency Health Office 2021-2026, one of which includes a program for organizing clean and healthy living movement activities, it is necessary to consider implementing activities that support the program. One effort to support the clean and healthy living movement is to wash hands. The World Health Organization (WHO) has called for it to be very important to enforce efforts to improve hand hygiene to maintain mutual health. Washing hands is important because it has been proven effective in preventing the spread of disease and also controlling infections. Tambakagung Village is a village located between two (2) sub-districts, namely Mojoanyar District and Bangsal District. The position of Tambakagung Village is classified as an underdeveloped village. The northern boundary borders Jabon Village; the south borders Sumbergirang Village; the west borders Sumolawang Village and the east borders Sumberwono Village (Dinas Komunikasi dan Informatika Kabupaten Mojokerto, 2023). The community in the village pays less attention to cleanliness and needs assistance in creating product innovations that can be used as a regional profile and increase community empowerment there.

Seaweed is chosen because this raw material is easy to obtain at an economical price but has high added value to be used as food or non-food processing. Therefore, with the advantages of seaweed connected to the problems of partners, it produces an action that needs to be implemented in the form of Community Service by the Faculty of Fisheries and Marine Sciences, Universitas Airlangga.

## **Research Methodology**

### ***Approach and Design***

This community service activity includes product diversification for making jelly candy and natural soap derived from marine seaweed. The initial efforts that have been made in this community service activity are to coordinate with the head of family empowerment and welfare Matahari and request a permit for the activity. Coordination and discussion have been carried out to ensure the mechanism for the community service activity and to collect aspirations and problems of partners. In addition, the time and place for carrying out counseling are also coordinated so that the facilities and infrastructure needed can be met and the community service activity can run according to plan and comply with health protocol regulations. Thus, the transfer of knowledge from the community service team can run smoothly. In addition, the community service team also made preparations related to counseling by designing a guide on how to make jelly candy and natural soap derived from seaweed.

This community service activity includes diversification of processed seaweed products, both food and non-food. For food, seaweed will be processed into raw materials for making jelly candy, while for non-food, it is natural soap. Before the presentation of the

material and practice of making the product, the members of family empowerment and welfare Matahari will be given a questionnaire to find out about the identity, level of education, age and knowledge of the participants related to processed seaweed products. Furthermore, the head of community service will provide a presentation regarding seaweed raw materials, explanations regarding its characteristics, uses, potential and how to process it. Then, it will be practiced how to make jelly candy and seaweed soap. The training participants will be divided into 3 groups with 10 members each. The group is given time to practice with their group members so that it is hoped that the participants will be able to make their own processed products after the counseling and community service training ends. During the practice, participants are given assistance in the preparation process of the materials until the final procedure in making jelly candy and sea rumout soap. After completing the practice, participants will have a question and answer session and a second questionnaire after the practice to find out whether there is an increase in participants' understanding of the jelly candy and seaweed soap production process. Monitoring and evaluation will be carried out after the counseling and training process with the aim of finding out the increase in participants' understanding of the process of making processed products and their implementation until they can be sold to the public.

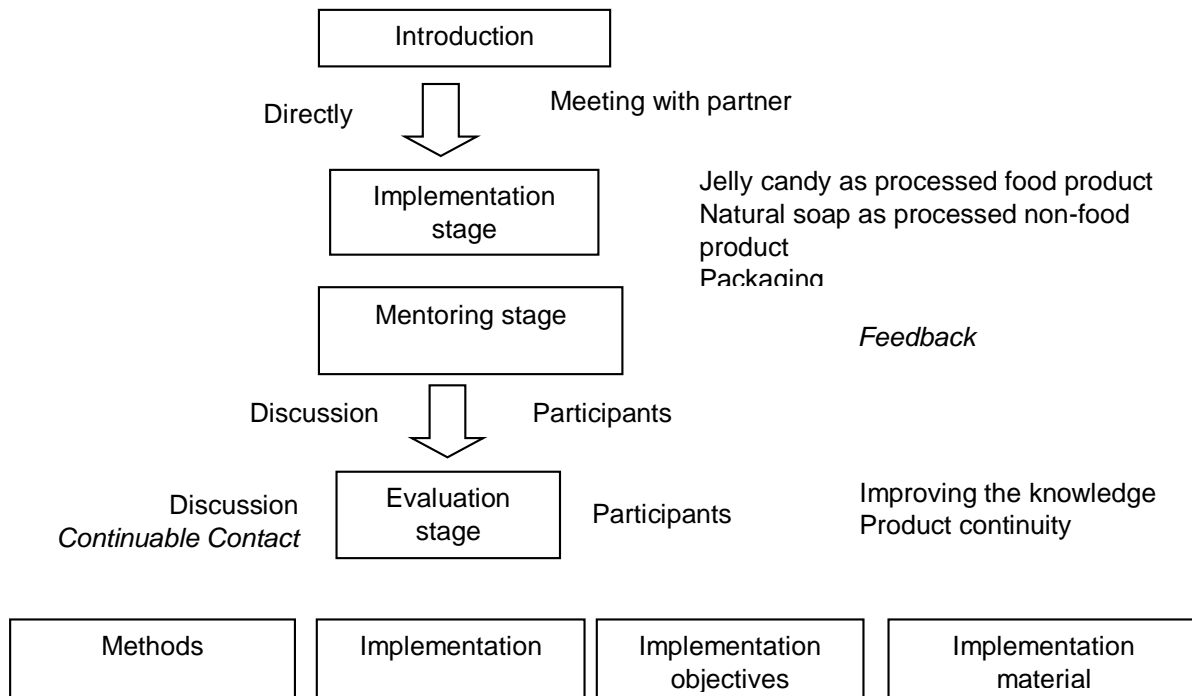


Figure 1. Methods of Implementing Community Service Activities

## Results and Discussion

Seaweed has the potential to be developed into processed food products such as jelly candy. In making jelly candy, the taste and texture of the jelly candy are crucial parameters and this will be influenced by the gel material used. Making jelly candy includes making a mixture of sugar cooked with the required solids content, adding gelling agents derived from seaweed with flavor and color and printing the product. Making jelly candy usually uses reversible gelling agents, namely if the gel is heated it will form a sol and when cooled it forms a gel again. In making jelly candy, *Eucheuma spinosum* is first washed and soaked in fresh water as much as 10 times the weight of the seaweed. The optimal soaking to get seaweed in the desired condition is soaking for 6-8 hours. The jelly making formula is a comparison between seaweed and sugar with ratio 1: 1 (w/w). The amount of sugar that exceeds the optimum amount will produce a gel that is rather soft, sticky, and very sweet. This is because the hygroscopic nature tends to reduce the hardness of jelly candy. If the amount of sugar is less than the optimum amount, the candy becomes less chewy and less sweet. This jelly candy made from carrageenan has a fairly chewy texture

### ➤ Tools and Materials

Tools: blender, pan, plastic basin, stove, stirrer, mold/tray, plastic packaging

Materials: seaweed (500 grams); water (250 mL); sugar (500 grams), citric acid (1.2 grams) and coloring agent.

### ➤ Procedure

1. Soak the cleaned dried seaweed for 6-8 hours.
2. Wash the seaweed again in clean water to soften and refresh.
3. Puree the seaweed using a blender until it becomes porridge
4. Cook the seaweed porridge with water until smooth
5. Add granulated sugar to the solution, stir until the solution thickens, add coloring, essence, citric acid to regulate acidity.
6. Put the solution into a mold / baking sheet
7. Leave for 1 hour at room temperature, then dry in the sun for 2 days
8. Cut and shape the jelly candy according to taste

The method of making soap consists of the cold process method. Making natural soap bases only uses oil and alkali bases and minimizes the use of chemicals. Furthermore, the natural soap-base products obtained can be modified by the melt and pour method to produce a variety of soaps. Currently, soaps on the market contain Sodium Lauryl Sulfate (SLS) which is one type of surfactant that has hydrophilic and lipophilic groups so that it can unite a mixture consisting of water and oil. However, if the concentration of surfactants used in making solid soap is more than 4%, it can trigger the formation of carcinogenic compounds and can cause skin irritation, so the use of this surfactant needs to be avoided by replacing it with more natural ingredients. The tools used to produce soap include digital scales, hand blenders, portable stoves, soap molds, beaker glasses, silicone spatulas, digital thermometers

Soap making using the cold-process method to produce opaque soap. The basic soap formulation can be seen in Table 1.

**Table 1.** Formulation for Making Natural Soap with Cold Process

Material	Amount (gram)
NaOH	73.3 gram
<i>Coconut oil</i>	500 mL
Distilled water	124.6 mL
Seaweed	4 gram
<i>Fragrance oil</i>	3-5 drops

The soap making process begins by dissolving 73.3 grams of NaOH with 124.6 mL of distilled water. In dissolving NaOH, make sure we pour NaOH into distilled water slowly, not the other way around because dissolving NaOH will cause a heat and smoke reaction. After the NaOH is dissolved, wait until the temperature drops to 40 °C. The next step is to prepare 500 mL of coconut oil and 4 grams of seaweed, finely ground using a blender. Next, the cold NaOH solution is put into the oil, homogenized and seaweed porridge is added. Stirring is carried out until a trace is formed (perfectly mixed) and fragrance oil is also added. The soap that is still in trace form is poured into the container/mold that has been provided and stored for 2-4 weeks before use.

The participants in this community service were very enthusiastic and grateful for being given education related to the production of soap and jelly candy from seaweed. They also want a similar program for the following years, where they want to be introduced to several processed products from mangroves and fish. By holding this community service, it is hoped that the community will have an increase in terms of ability, willingness and skills in producing soap and jelly candy which can also be a health and empowerment branding for the community, especially in Mojokerto, East Java.

## Conclusion

The community service that has been carried out to residents in Mojokerto, East Java province has received high enthusiasm which is shown by high enthusiasm and motivation to participate in workshop and training activities. The participants synergize with the community service team of the Faculty of Fisheries and Marine, Universitas Airlangga in innovating product from seaweed into jelly candy and natural soap, developing the creativity of the partner as well as improving the social welfare.

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