

Training on the Production of Chitosan Fish Preservatives (PETASAN) and Digital Marketing for Fish Traders in Kalanganyar Village

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Abstract: Kalanganyar Village is a village located at the eastern tip of Sidoarjo Regency. Geographically, Kalanganyar Village borders directly on the sea, so almost 2/3 of the area of Kalanganyar Village is aquaculture area. Most of the residents' livelihoods are subsistence farming and fish trading. The problems faced by village residents are related to food security and marketing management. Therefore, there is a need for training on fish preservatives made from natural ingredients, namely chitosan, and digital-based marketing for fish traders. The method for implementing this activity is the Participatory Rural Appraisal method; a group of fish traders are involved in planning and carrying out this community service activity. This activity improved the quality of fish products by using chitosan-based preservatives, increasing product hygiene, and increasing skills in conducting digital marketing using the help of artificial intelligence. From this activity, a plucking thorn group and a mundak bati group were also produced, which had a governance organizational structure so that the operational management of the group was more structured and neat, both of which were approved by a decree from the Head of Kalanganyar Village.

Keywords: Artificial Intelligence, Chitosan, Digital Marketing, Fish Traders, SDGs.

Introduction

Kalanganyar Village is one of the villages located at the eastern end of Sidoarjo Regency. Geographically, Kalanganyar Village borders the sea directly, so almost 2/3 of Kalanganyar Village's area is aquaculture land. This condition also affects the demographics of society in terms of livelihood. Although not as fishermen, most of the people in Kalanganyar Village earn their living as pond farmers, cultivating a pond and making it their source of life. In addition to being pond farmers, some people also work as fish collectors, distributors, and traders. The condition of the fish market in Kalanganyar village can be seen in the following video: <https://www.youtube.com/watch?v=M5sCE3y3sLo>.

According to Mr. Tohari, one of the fish vendors in Kalanganyar who gets his fish supply from local

farmers and fish distributors in the Sepanjang area, Sidoarjo, he sells at least ten different types of fish every day. The biggest challenge faced as a fishmonger is keeping the fish fresh. To keep the fish fresh, we still rely on freezers to this day. This method can be used during storage and distribution, but it becomes a problem when the fish is displayed for sale to buyers. Not all fish stalls in the market are equipped with electricity, let alone freezers. As an alternative, and as a substitute for a freezer, most fish vendors choose to add ice chunks when displaying their goods to keep the fish fresh. This method, however, is quite risky, as some types of fish and shrimp cannot last long after the ice melts. The melting of the ice will increase the volume of water soaking the fish, causing it to spoil quickly. Another commonly used alternative to extend the shelf life of fish is to add salt and dry it into salted fish. In 2021, formalin-

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preserved salted fish was still found at fish stalls in the Bandung area (Rovita & Wulandari, 2022).

Improper fish handling can reduce fish quality, which impacts its market value. Therefore, adding preservatives to fish during storage, distribution, and sale can extend the shelf life of the fish. Chitosan can be a base material for fish preservatives that are safe for the body and environmentally friendly. This is consistent with several studies reporting that the use of chitosan can extend the shelf life of fish (Malekkolaei et al., 2025; Rochima et al., 2025; Shidqi et al., 2025). The research results indicate that the addition of chitosan can inhibit the formation of bacteria that cause spoilage and allergies, as well as other bacteria (Wei et al., 2022; Wrońska et al., 2021).

Chitosan is a derivative of the polymer chitin, produced from fishery waste such as shrimp, crab, and blue crab shells. Chitosan has amino and hydroxyl functional groups that can act as antibacterial agents (Ahmed et al., 2025). This is what makes chitosan suitable for preserving fishery products as an alternative preservative to replace toxic synthetic preservatives like formalin. Besides having antibacterial properties, chitosan is also safe to consume because it is a polysaccharide compound (Muñoz-Tebar et al., 2023). Based on the explanation above, the next step is to disseminate the benefits of chitosan to the community, especially fishmongers, to help partners solve the problem of extending the shelf life of fish through the creation of PETASAN (a chitosan preservative).

After disseminating the benefits and methods of making chitosan preservatives, it is hoped that the shelf life of fish will be extended, thereby increasing sales and distribution reach. Therefore, digital marketing training was also conducted during the community service activities to equip the public with how to brand and market fish products digitally, thus expanding the market reach of the fish sold by the vendors. Thus, sales turnover also increases (Islam et al., 2025).

This service activity also involves students through the Merdeka Belajar Kampus Merdeka program, which aims to build villages so that the university's key performance indicators (KPIs) related to students gaining experience outside of campus can be realized. For the faculty members implementing the service activity, this event is beneficial in supporting one of the Key Performance Indicators (IKU), namely faculty members engaging in activities outside the campus, thus enabling integration. This off-campus activity will provide an opportunity for lecturers to disseminate their knowledge and/or research findings to solve partner problems. The main performance indicator in this service is that the partner community has skills in making FIREWORKS and applying them to extend the shelf life of fish. Meanwhile, the additional performance

indicator for this service activity is that the community has digital-based marketing skills. This is supported by the educational background and experience of the service providers, which are in the fields of chemistry, management, and digital business, making them suitable for application.

The first focus of this activity is education and training to transfer knowledge and technology related to FIREWORKS for inhibiting bacterial growth and extending the shelf life of fish. It is hoped that from this activity, economically productive communities can further increase their productivity with a longer shelf life for fish. The second focus is that after the shelf life of fish is extended, marketing networks can be expanded through digital marketing (Kamau et al., 2025).

Method

The method for implementing this community service activity uses the Participatory Rural Appraisal (PRA) method. The PRA method is an approach in community empowerment activities that involves the community in all development and empowerment activities. This approach involves the community as the planner and implementer of development and empowerment, not just as an object of development and empowerment (Heaton et al., 2024).

1. Implementation method:

- Counselling and mentoring on making FIREWORKS. In this stage, the partner lecturer in chemistry who is carrying out the service will provide socialization on how to make fish preservatives from chitosan, which is a bioplastic (Junaidi et al., 2023). The evaluation conducted to assess the success of implementing this method is through question-and-answer sessions regarding the partners' understanding and through observation of the resulting bioplastic products.
- Education and assistance in making ice gel for fish storage. In this activity, the community was given education on how to make ice gel by lecturers from the service team in the field of chemistry. Next, the community demonstrated how to make ice gel, accompanied by students. The evaluation conducted to assess the success of implementing this method was through question-and-answer sessions regarding the community's understanding and through observation of the results of making ice gel for fish storage.
- Digital marketing management and entrepreneurship mentoring. In this activity, partners were given training on how to create social media, websites, and e-commerce for digital marketing, including WhatsApp Business, TikTok, Artificial Intelligence (AI) like ChatGPT,

Google My Business, and how to create a website using AI. Partners were also taught how to collaborate with third parties to help expand distribution reach. In terms of entrepreneurship, partners are guided to obtain official business permits, learn how to write bookkeeping and analyze the impact and follow-up of bookkeeping results, and learn how to attract buyers to increase sales. Digital marketing began with content creation and the management of online shopping or e-commerce applications by lecturers with backgrounds in economics and management, assisted by students. The evaluation conducted to assess the success of implementing this method is through the neatness of digital-based bookkeeping and the increase in sales of fishery products sold through e-commerce platforms.

2. Partner participation in program implementation. Partner participation in this program's implementation involves providing time and effort to attend training and supplying their fish for PETASAN implementation.
3. Program implementation evaluation and program sustainability in the field: Program implementation evaluation and sustainability are conducted by monitoring and evaluating once a month after program implementation to observe the application of PETASAN and the impact of digital marketing on increasing the sales of the fish merchant group.

Result and Discussion

This community service activity will be carried out from June to November 2024 in Kalanganyar Village, Sedati District, Sidoarjo Regency. This activity involves a group of fishmongers, students, and the Kalanganyar Village apparatus. The initial stage is a discussion with village officials and representatives of fish merchant groups regarding the problems they are experiencing and the permits for conducting this community service activity.



Figure 1. Discussion with the Village Secretary and Representatives of the Fish Merchant Groups Source: Personal Documentation

The village officials welcomed this community service activity by supporting the approval of the formation of fish merchant groups, which were divided into two groups: the Cabut Duri group and the Mundak Bati group. The Cabut Duri group is a group of fish merchants who sell deboned fish and provide fish deboning services, especially for milkfish. This group is centered in RT.18 RW.04, Kalanganyar Village, Sedati, Sidoarjo. The Mundak Bati group is a group of fish merchants focused on food security, selling frozen fish and processed fish products, consisting of 15 members from various RTs in Kalanganyar village. Next, from that discussion, it was agreed to form the governance organizational structure in Figure 2 to clarify the roles and operations of the group.

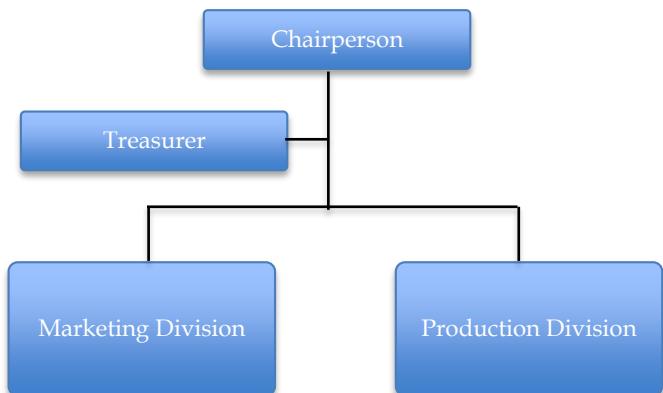


Figure 2. Organizational Structure of the Mundak Bati Group's Governance

The second stage is training on making fish preservatives from chitosan (PETASAN). At the beginning of the training, the community service team first introduced chitosan. All members of the fish merchant group who initially didn't know about chitosan came to understand that chitosan is a safe material for the body. Next, we move on to the stage of how to make FIRECRACKERS. FIRECRACKERS are made of a layer of chitosan bioplastic that has antibacterial activity, thus preventing the spoilage of fish by bacteria. The training resulted in the FIREWORKS shown in Figure 3. In addition to how to make FIREWORKS, the community service team also trained the fish merchant group on how to make ice gel. This activity produced a video on how to make ice gel. Next, PETASAN is used to preserve milkfish combined with the vacuum chilling method.



Figure 3. (a) Chitosan bioplastic used as a fish preservative (PETASAN); (b) ice gel; (c) fish product dendeng bandeng with vacuum packaging

Source: Personal documentation

The third stage is digital marketing training. This digital marketing has proven to be able to expand market share because it is not limited by location (Purwanto & Revaldo, 2023). The digital marketing

technologies introduced include WhatsApp Business, the use of AI such as ChatGPT, TikTok, and Google My Business. The use of AI has been proven in several studies to increase product sales (Bocean et al., 2025; Madanchian, 2024). Figure 4 shows documentation of digital marketing training activities. In addition to face-to-face training, the community service team also produced digital marketing tutorial videos, one of which was on creating a WhatsApp Business account.



Figure 4. Atmosphere of digital marketing training for fish merchant groups

Source: Personal Documentation

Tabel 1. Outcomes of PETASAN Training and Digital Marketing for Fish Traders

No	Element	Fish Quality Results		Quantity
		Problem Solving	Result	
1	Fish preservation	Training on making PETASAN (fish preservative from chitosan)	Partners can make fish preservatives from chitosan and can make ice gel as a substitute for ice.	Purchase of fish preservative making equipment from chitosan and ice gel, 2 sets for 2 groups of traders (1 group consists of 10-20 people). Extending the shelf life of fish from the initial 3 days to 9 days.
2	Increased revenue	Training on digital marketing expansion utilizing social media, e-commerce, and third parties to assist with distribution is needed.	Mitra has a WhatsApp Business account, a Google My Business account, and is able to create marketing content with the help of AI.	A 25% increase in sales volume.

No	Element	External Targets in the Field of Management		Quantity
		Problem Solving	External Target	
1	Marketing management	Creativity in attracting buyers and digital marketing	A 25% increase in revenue	Previously, their income was 280 milkfish per week. After implementing digital marketing, there was an increase of 350 orders per week.
2	Business legality	Assisting in the management of the partner group's legalities	The partner has a business registration number.	Mitra has a Business Identification Number.
3	Financial management	Bookkeeping training assistance, impact analysis, and follow-up efforts	The organizational structure for governance has already been established within the partner group, resulting in more organized group operations and financial management.	As many as 75% of partners understand financial management.

Conclusion

This training activity can enhance the knowledge and skills of the fish merchant group regarding the use of natural fish preservatives and digital marketing with the help of AI. The increased knowledge and skills of this merchant group will lead to improved product quality, group operational management, and the group's turnover. The obstacle in this activity is the relatively higher price of chitosan material compared to hazardous preservatives available in the market. Therefore, training on chitosan production is needed to reduce production costs and increase the variety of products sold by the fish merchant group.

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