

## EMPOWERMENT OF BANGAH VILLAGE COMMUNITY GROUP IN SIDOARJO DISTRICT THROUGH CATFISH-BASED FOOD DIVERSIFICATION

Dwi Iriyani<sup>1</sup>, Asrul Bahar<sup>2</sup>, Berlina Hidayati<sup>1</sup>, Ita Fatkhur Romadhoni<sup>2\*</sup>

<sup>1</sup>Universitas Terbuka, Jakarta, Indonesia

<sup>2</sup>Universitas Negeri Surabaya, Surabaya, Indonesia

\*itaromadhoni@unesa.ac.id

**Abstrak:** Salah satu desa di Kabupaten Sidoarjo yaitu Desa Bangah sebagai wilayah penghasil ikan lele dengan kapasitas produksi kurang lebih 10 ton per tahun. Namun demikian, kelompok masyarakat desa tersebut masih menghadapi kendala pengembangan produk olahan berbasis ikan lele. Kegiatan pengabdian masyarakat ini bertujuan untuk memperkuat kemampuan masyarakat peternak lele di Desa Bangah, Sidoarjo dalam menciptakan produk olahan pangan berbasis ikan lele yang beragam menggunakan teknologi makanan beku. Program ini juga memberikan pelatihan dan penyuluhan tentang penggunaan situs web e-commerce, media sosial, dan marketplace yang ada untuk meningkatkan pemasaran produk. Metode yang digunakan adalah berbentuk pelatihan terkait pembuatan berbagai macam produk olahan berbasis ikan lele seperti pempek, nugget, dan aneka dimsum berbasis ikan lele. Selain itu komunitas juga didampingi dalam pembuatan kemasan produk serta pendaftaran di e-commerce untuk proses marketing. Hasil program ini menunjukkan bahwa sebanyak 92% dari total peserta dapat membuat produk diversifikasi pangan yang berbasis ikan lele dengan berbagai resep standar. Produk olahan ikan lele yang dihasilkan memiliki kriteria kualitas dan ciratasa yang disukai oleh masyarakat. Program ini dapat menjadi salah satu upaya untuk meningkatnya keterampilan masyarakat dalam memproduksi pangan yang berbasis ikan lele sehingga akan berdampak positif pada tingkat pendapatan masyarakat.

**Kata Kunci:** diversifikasi pangan, pemberdayaan masyarakat, produk olahan ikan lele

**Abstract:** Bangah Village, Sidoarjo Regency, is one of the largest catfish-producing areas in Sidoarjo Regency, with catfish production of more than 5 tons to 10 tons annually. However, the catfish farmer community groups in the village still face challenges in developing catfish-based food products. This community service program aims to strengthen the ability of catfish farmers in Bangah Village, Sidoarjo, to produce diverse catfish-based food products using frozen food technology. This program also provides training and outreach on using existing e-commerce websites, social media, and marketplaces to increase product marketing. The method used was training in producing various catfish-based processed products such as pempek, nuggets, and various catfish-based dimsum. In addition, the community was also assisted in designing product packaging and registration in e-commerce for the marketing process. The program results show that 92% of the participants could create diversified catfish-based food products with various standard recipes. Through this program, the community can produce catfish-based food products that are of good quality and taste. This program can be one of the efforts to increase community skills in producing catfish-based food that positively impacts community income levels.

**Keywords:** food diversification, community empowerment, catfish-based food products

### Introduction

Bangah Village in Sidoarjo Regency is one of the largest catfish-producing areas in the district. It has an area of 13.84 km<sup>2</sup> and a population density of 1,535/km<sup>2</sup> spread across 18 neighborhoods (Kurniawan, 2020). The village has been one of the pilot projects for small and medium enterprise-based catfish farming for the past five years. In its development, catfish

production has increased every year, triggering several problems. Catfish production per year is more than 5 to 10 tons from Bangah village.

However, catfish farmers complain that there are many marketing constraints, resulting in ineffective marketing of crops because catfish marketing depends on buyers from the restaurant sector and large traders only (Suroto, 2022). Catfish cultivation can be harvested in 4 months, but the marketing is not maximized, so the harvest period is forced to be delayed up to 6 months. This situation causes farmers to incur additional costs for feed needs that should have been harvested (Pudji & Yuliatin, 2021). To overcome these problems, harvested catfish are processed into processed food products that are more durable.

Based on previous research (Amar et al., 2022), the solution offered to overcome the problems that occur in Bangah Village is to introduce and provide training on processing processed catfish food products to partners with frozen food technology and provide training and socialization on the use of e-commerce web, social media, and existing marketplaces to increase marketing of processed catfish products. Meanwhile, according to Armiami & Supono (2020), the results of catfish farming can be developed into various types of dried food as regional souvenir products.

Therefore, the community service activities that will be carried out are training and practice of Empowering the Bangah Village Community Group through Fish-Based Food Diversification to increase the productivity of catfish in Bangah Village, Gedangan District, Sidoarjo Regency. Substantively, these activities are relevant to the Open University's Community Service goals in 2023, namely organizing community empowerment programs throughout the UPBJJ-UT region, which include efforts to improve education and community welfare.

In other words, the relevance between the need to increase the capacity of the community in the environment of the Surabaya Open University Distance Learning Program Unit and the scientific field resources owned by the community welfare team (Wiyani, 2020). The choice of this type of community service activity illustrates the spirit to actively contribute to the program to increase Indonesia's Human Development Index (HDI) sustainably with coverage of all regions in Indonesia (Armiami & Supono, 2020).

This training program can significantly impact the village economy. By improving the skills and productivity of MSME workers, the program will create new jobs, increase their incomes, and strengthen the overall local economy. The expected results of this community service activity can increase partners' knowledge about how to process various processed food products made from catfish and market these processed products.

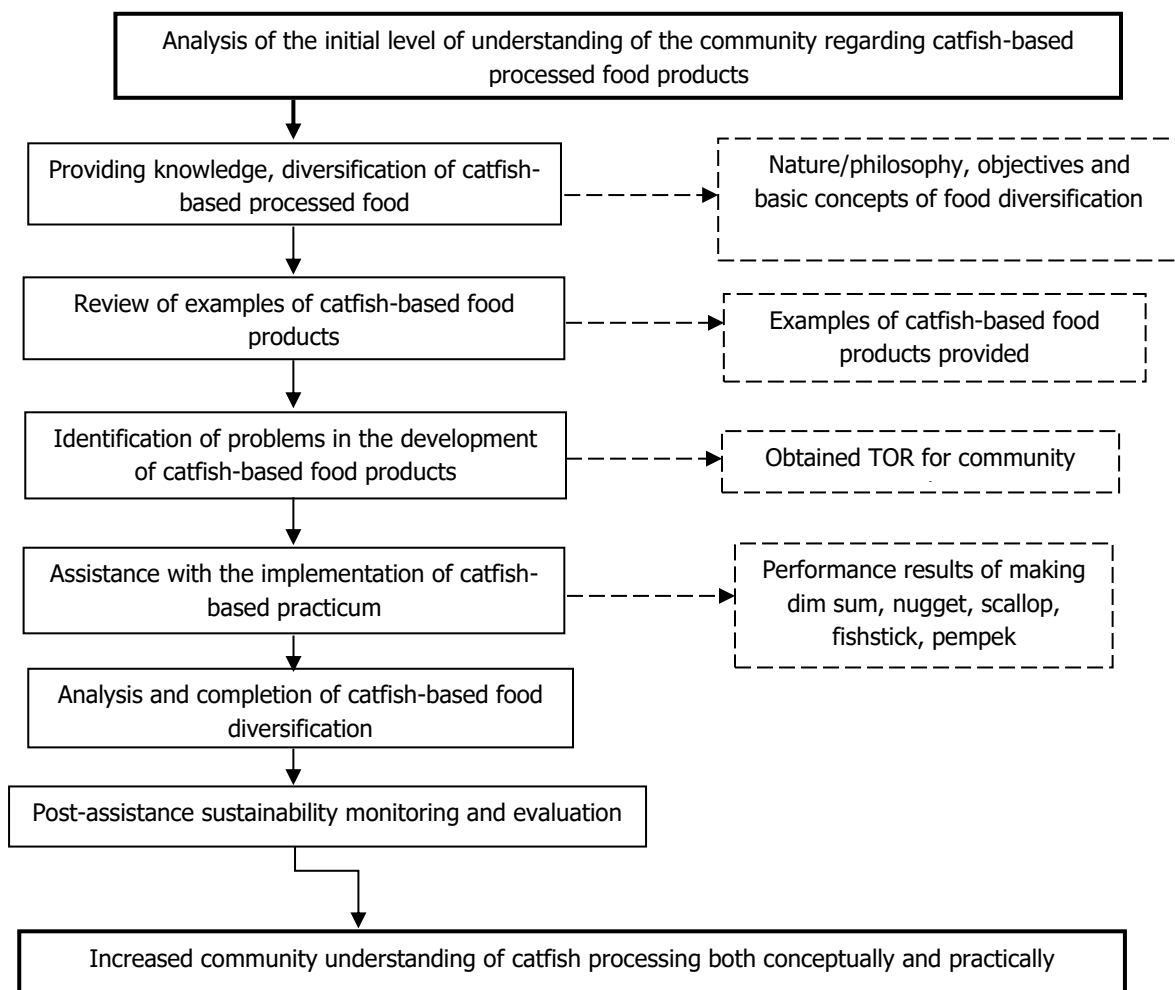
## **Method**

The community service activities carried out are based on actual problems that occur in Bangah Village, Sidoarjo. Hence, the design of activities to solve solutions must follow the needs of community groups in the village. The method of this program was direct training with lecture, discussion, and practice methods. The training was conducted over two days. The material focuses on information regarding the introduction of fish-based food diversification

and the provision of online marketing. The characteristics of the training participants are Bangah villagers who have catfish farming with an average production of 100 kg per week. There were 30 participants, consisting of 24 women and 7 men. Participants were given time to do the exercises after the trainer's demonstration. Furthermore, they independently had a chance to make catfish-based preparations according to the guidelines provided. At the end of the session, the resource person discusses the study of processed catfish-based food demonstrated by the community and how to market it online.

The training on catfish-based food diversification for the community of Bangah Village, Gedangan Subdistrict, Sidoarjo Regency that has been carried out is as follows: a) Training is oriented to the final product in the form of food practicum performance in catfish nuggets, scallops, and fish sticks, b) The training is conducted using multi-methods, allowing participants to get challenges in following the training process, c) The training is filled and accompanied by experts in their fields so that various questions and misunderstandings of the participants regarding the training material are described more easily and clearly.

Figure 1 shows the problem-solving framework to address the issues in the Catfish-Based Food Diversification in Bangah Village.



**Figure 1.** Problem-solving Framework

The community service program was conducted through training and mentoring and included several stages. The stages and their descriptions are shown below.

*Preparation Stage*

At this stage, the participants of the catfish-based diversification training activities for the Bangah Village community were determined. After the program's participants have been determined, the next step is determining the number of community quotas participating in training and mentoring. The next step was to distribute invitations to the people in Bangah Village with the number of participants following the quota that had been determined. The location chosen was the meeting room or hall at the Bangah Village Office in Gedangan Subdistrict, Sidoarjo Regency. The next step was providing the equipment, including computers, internet connection, LCD, modules, and tools to process dimsum, nuggets, clams, and fish sticks. Training materials for the practicum of processed catfish to support the innovation of original village online products were also prepared at this stage.

*Training Implementation Stage*

At this stage, the training process in the form of practicing processing catfish into nuggets, scallops, dimsum, and fish sticks in Bangah Village began. The implementation of the training started with the process of filling in the attendance list by the training participants, the introduction process, the process of delivering the material followed by the practice of dimsum, nuggets, scallops, and catfish fish sticks, and assistance in creating an online store.

*Training Evaluation Stage*

The evaluation aims to determine the response of the training participants and the achievements obtained in this training process, both before and after the assistance. The activities were evaluated during the process and at the end of the training on the aspects of achieving the training objectives and the training organization. The process and results (achievement of training objectives) were evaluated by questions and answers questionnaire and observation. Meanwhile, the evaluation of the aspects of the training organization was carried out by giving a questionnaire. The type of questionnaire used in this activity combines open and closed questionnaires. So, respondents will be given predetermined answer choices, but other answer options can be answered freely. Before being given to the trainees, the questionnaire instrument was tested for validity and reliability. Then, the response results were analyzed with the stages of editing and coding data, followed by data entry and general data presentation. There are two indicators of success in the implementation of training: (1) evaluation during the training process and (2) post-training evaluation.

## **Results and Discussion**

The community service through the catfish-based food product diversification program has been carried out successfully. In accordance with the agreement with the Bangah village community group, it was agreed that the training activities included the process of making nuggets, pempek, and various catfish-based dimsum. Following the plan of the program, 30

participants were invited. In the training implementation, there were 30 participants, consisting of 24 women and 7 men. In other words, the participation level of participants was 100%.

The achievement of the training objectives can be said to be good (90%). There was an increase in participants' knowledge about catfish-based food diversification. The remaining 10% was less successful because several participants participated in training in different groups, so they did not focus on training to make commercial food diversification. Empowerment of mothers in the Bangah Village Community Empowerment environment in processing catfish-based food ingredients into commercial food is expected to be well realized by providing several processed catfish recipes that are easy to process and have an appearance that follows current trends.

**Table 1.** The Results of Assessment of the Program's Implementation

Aspects observed	Assessment				Total
	SA	A	DA	SDA	
<b>Preparation</b>					
The trainer provides an overview of the training activities to be implemented	13	15	0	0	30
The trainer explains the steps to be taken in making catfish-based frozen food.	15	15	0	0	30
The trainer gives an example of how to make the food product to be made	10	20	0	0	30
Frozen food ingredients are easily available in Bangah Village, Gedangan Subdistrict, Sidoarjo.	13	15	2	0	30
The main training equipment has been provided by the community service team	15	15	0	0	30
<b>Training Materials</b>					
Training materials are accessible for participants to understand	20	10	0	0	30
Training materials help develop participants' businesses (PMD members)	10	20	0	0	30
The training material meets my individual needs	12	12	6	0	30
<b>Delivery of Training Materials</b>					
The delivery of material by the community service team is exciting	15	14	1	0	30
Training equipment is easy to find in the home environment	20	10	0	0	30
Time allocation for participants to practice is sufficient	10	15	5	0	30
Evaluation is conducted at the end of the training	15	15	0	0	30
<b>Practice Implementation</b>					
The coach gives directions if there are any mistakes in the food processing process	10	10	10	0	30
The trainer helps participants who find it difficult to make products	20	10	0	0	30
The trainer gives the participants the opportunity to practice on their own without assistance.	17	13	0	0	30
The trainer allows participants to try to develop their own skills	15	15	0	0	30
Trainers always provide input in making products	13	15	2	0	30
Commercial frozen food products are easy for participants to make	13	15	2	0	30

**Description:** SA = Strongly Agree; A = Agree; DA = Disagree; SDA = Strongly Disagree

The ability of participants to master the material can be said to be quite good (90%). The delivery of material using lecture and practice methods supports the participants' ability to master the material presented by the community service team. Several important points are included, including the technique of delivering the material. In this activity, we were assisted by the Head of Bangah Village Community Empowerment and the Heads of Community in the

Bangah Village area in transferring the information provided to PMD members, most of whom were housewives.

Table 1 above shows the assessment results of community service activities, focusing on specific aspects observed and assessed by the trainees. The activity consists of four main parts, namely Preparation (A), Training Materials (B), Delivery of Training Materials (C), and Practice Implementation (D).

First, section A (Preparation) includes an assessment of the training preparation. The assessment results showed that the trainers provided a good overview of the training activities (30 points) and the steps for making catfish-based frozen food (30 points). In addition, the ingredients were easy to obtain in the Bangah Village environment, but there were some constraints on the ingredients (2 points), and the training equipment was well provided (30 points). Training preparation plays a vital role in the training process, resulting in quality training (Srijani et al., 2022). This is following the quality management process. Thus, preparation in training is included in the input structure indicators that must be met in accordance with predetermined standards (Al Hakim & Indrawati, 2021).

Second, section B (Training Materials) assesses the success of the training materials (Figure 2). Respondents or participants rated the training materials as easy to understand (20 points) and helpful in developing participants' businesses (PMD members) (20 points). However, some respondents felt the materials did not meet their needs (6 points).

Third, section C (Delivery of Training Materials) assesses the quality of the community service team's material delivery (Figure 3). In general, the material delivery was considered interesting (15 points), although some respondents felt there was a little boredom (1 point). Training equipment was easy to find in the home environment (20 points), and the time allocation for practice was considered sufficient (10 points).



**Figure 2.** Training on Catfish-Based Food Products

Finally, section D (Practice Implementation) evaluates the implementation of the practice by the participants (Figure 4). The results showed that the trainers gave directions if there were any mistakes (10 points) and helped participants who were struggling (20 points). Most participants felt that they were allowed to do their practice without assistance (17 points). However, some respondents thought that the evaluation of their products was lacking (2



points). The trainers were also considered to provide good feedback in making products (15 points), and participants considered commercial frozen food products to be easy to make (13 points).



**Figure 3.** Delivery of Training Materials

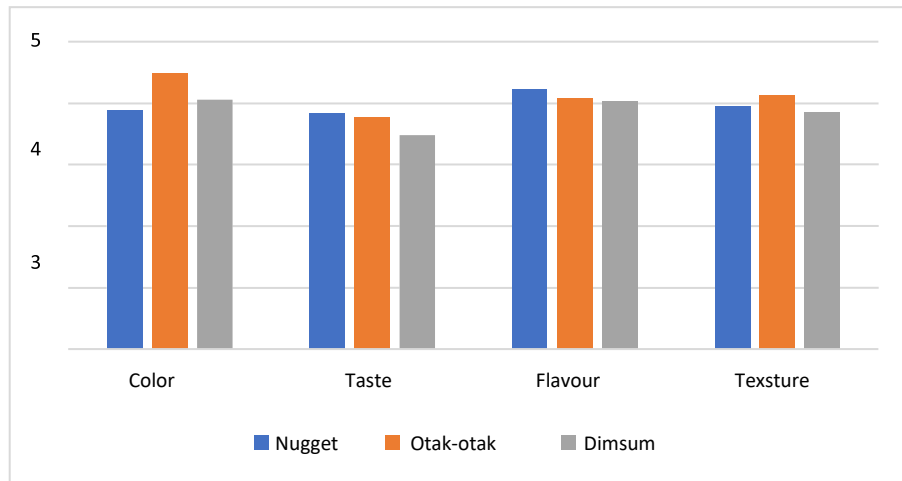
The monitoring and evaluation stage is carried out on the implementation and products of community service activities. The implementation of activities is evaluated by the head of the community service team by controlling each activity, such as material preparation activities, tools, production, product quality, and packaging. All activities are carried out in coordination with the community service team. After the activity runs according to the planned schedule, the next step is to evaluate the quality of the community service products, namely catfish-based food diversification. Product evaluation is carried out to assess the quality of the product whether the community can accept it or not. Product evaluation uses a hedonic test, and the instrument used is a hedonic questionnaire. The products assessed were various processed products based on catfish, such as nuggets, otak-otak, and catfish dim sum. Product assessment indicators consist of 1) color, 2) texture, 3) aroma, and 4) taste. The assessment uses a Likert scale, which is 1-4, with the panelists used trained and semi-trained panelists, as many as 30 panelists. The results of the assessment are shown in [Figure 5](#).



**Figure 4.** Practice of Making Catfish-Based Food Products

Based on the analysis of respondents showed that the color of nuggets, otak-otak and dimsum using the composition of panir flour and the addition of catfish with different levels had no significant effect ( $P \geq 0.05$ ) on the color of the nuggets. Previous study stated that the

smooth surface of nuggets is not a characteristic expected by consumers and consumers place the element of taste as the most influential factor in the acceptance of nuggets, followed by the elements of aroma and color (Luthfiyah & Anugrah, 2021). Also, other results showed significant differences in texture (p-value = 0.000), flavor (p-value = 0.000), and aroma (p-value = 0.000) between market catfish carrot nuggets and organic catfish carrot nuggets. However, no significant difference was found in terms of color based on the analysis conducted (Nurhayati & Siregar 2023).



**Figure 5.** Hedonic Sample Test Results of Catfish-Based Food Diversification Products

Aroma assessment is a subjective assessment that requires sensitivity to taste and smell. The cooking process plays a vital role in this case because during cooking the fat in chicken nuggets will produce volatile components that cause the appearance of aroma in chicken nuggets. With cooking, volatile compounds will arise that will produce a unique taste and aroma of cooked meat (Mansyur, 2022). Catfish nuggets have distinctive characteristics, namely texture that is dry hollow (porous), crispy, and oily on the crusty outer layer but soft and wet on the inside. Soft and moist on the inside of the product, just like fried products that have juiciness. Generally, nuggets require fillers to increase product volume and produce a dense and compact texture (Herdiana et al., 2023). The level of chewiness of the nugget itself can influence the panelists' liking for the texture of the nuggets. The aroma of fish nuggets is thought to be influenced by the protein content that breaks down into amino acids, especially glutamic acid, that is present in fish meat and seasonings. According to Yusuf and Musali (2021), the aroma of seasonings such as garlic, shallots and pepper can serve as a flavor enhancer for nugget products. Garlic, shallots, and pepper can be an aroma enhancer in fish nugget products.

The texture analysis results of catfish-based food diversification products showed that the higher the proportion of catfish, the higher the panelists' favorability score for nugget texture. Catfish have excellent protein that can interact well with water and protein in nuggets (Sukarjati & Wibowo, 2023). The steaming process of nuggets results in a gelatinization process that can bind flour which tends to be high and can fill the spaces between ingredient components to produce a more compact dough (Pujiastuti & Ngatilah, 2021). Meanwhile, the



taste produced from various types of catfish-based product diversification shows the resulting taste is savory and delicious. This is in accordance with the opinion earlier study which states that panelists prefer savory snacks and a little spicy taste (Swastawati et al., 2021). The savory taste or in catfish products is produced from fresh fish protein, which tends to be chewy and juicy.



**Figure 6.** The Results of Catfish-Based Food Product

Furthermore, enriching various processed catfish can provide better benefits than utilizing chicken meat in general (Mansyur, 2022). Catfish is a type of freshwater fish widely cultivated and in demand by the public. Besides containing high nutrients for health, catfish has promising prospects or business opportunities. Catfish have a complete nutritional content, especially a high content of amino acids such as leucine and lysine (Suroto, 2022). The team conducted a literature study on the nutritional- content of catfish. Catfish have a great opportunity to be developed because their nutritional content is abundant. However, it is still not widely utilized as an ingredient to be developed into commercial food (Suciyono et al., 2020). Table 2 shows that 100 g of catfish contains the following nutrients.

**Table 2.** Analysis of Catfish Nutritional Content

Materials	Nutritional Content
Water Content	78.5 grams
Calories	105 grams
Protein	18.7 grams
Fat	2.9 grams
Calcium (Ca)	15 grams
Lemongrass Phosphor (P)	260 grams
Iron (Fe)	2 grams
Sodium	50 mg
Thiamin	0.10 grams
Ribovlavin	0.05 gram
Niashin	2.0 grams
Vitamin A	150 mg
Vitamin B	0.05 mg

**Source:** Unnes Journal of Public Health (Munawaroh & Jacobeb, 2020b)

Besides being low in calories and sodium, catfish is packed with protein, healthy fats, vitamins, and minerals. Therefore, processed catfish is a nutritious menu that anyone can consume, from babies, children, nursing mothers, pregnant women, adults, and the elderly (Munawaroh & Jacob, 2020). However, it is also worth remembering that catfish can be harmful if processed improperly. For example, cooking using unhealthy oil. For this reason, in this year's community service activities, our team provides several preparations with catfish as the primary ingredient combined with various recipes and cooking methods that certainly produce delicious processed catfish and contain high nutritional value and are beneficial for health (Mubarak et al., 2021).

Based on Table 2, processed foods with essential ingredients from catfish are made. The Universitas Terbuka Surabaya community service team and Universitas Negeri Surabaya Lecturers introduced and practiced five processed catfish recipes, namely: catfish nuggets, catfish dumplings, catfish nori rolls, catfish skin dimsum, and catfish pempek. During this time, the Bangah Village community processed catfish only fried or cooked vegetables and it could not last long. To find a solution for the Bangah Village community, when the catfish harvest is abundant and the selling price drops, the catfish harvest can be processed into frozen food with a variety of different flavors.

## **Conclusion**

Based on the results of the activities that have been carried out, it can be concluded that the implementation of Community Service entitled Empowerment of Bangah Village Community Groups in Sidoarjo Regency through Catfish-Based Food Diversification has been carried out well. Good criteria have been measured based on the measurement scale through the instrument, namely that the training participants feel significantly helped by this activity, as evidenced by the assessment results, which state that 92% of participants are able to make various processed catfish according to standard recipes smoothly, and according to the planned schedule. The catfish-based food products also have the criteria for results and characteristics favored and acceptable by the Bangah Village Community, Gedangan District, Sidoarjo Regency. However, partners must be able to develop more durable catfish development recipes. In addition, they must also improve their skills in using digital marketing, such as Shopee and Tokopedia to support marketing. This training program positively impacts economic improvement and the sustainability of catfish farming. Researchers believe that with the support of village officials, both material and administrative, it will be able to increase the village's original income in the next few years.

## **Acknowledgement**

We want to thank the Bangah village community as the partner of this community service program. We would also like to thank the parties or stakeholders involved in this program.

## References

- Al Hakim, A. L., & Indrawati, L. R. (2021). Upaya Pengembangan Kewirausahaan Melalui Kegiatan Pelatihan Pemuda Di Daerah Istimewa Yogyakarta. *Jurnal Praksis Dan Dedikasi Sosial (JPDS)*, 4(2), 88. <http://dx.doi.org/10.17977/um032v4i2p88-92>
- Amar, M. I., Martana, B., Rizal, R., & Hidayati, A. N. (2022). Peningkatan Pengetahuan Dan Keterampilan Masyarakat Tentang Pengolahan Hasil Budidaya Ikan Lele Melalui Diversifikasi Pada Olahan Ikan Lele. *JMM (Jurnal Masyarakat Mandiri)*, 6(2), 1340-1348. <https://doi.org/10.31764/jmm.v6i2.7204>
- Armianti, S., & Supono, S. (2020). Aptimas (Modul Penelitian Dan Pengabdian Kepada Masyarakat). *Jurnal SITECH: Sistem Informasi dan Teknologi*, 3(1), 1-8. doi: 10.24176/sitech.v3i1.4235. <https://doi.org/10.24176/sitech.v3i1.4235>
- Herdiana, N., Susilawati, S., Koesoemawardani, D., & Rahayu, E. (2023). Penambahan Tepung Ubi Jalar Ungu (*Ipomea batatas* L) dan Tapioka Sebagai Bahan Pengisi Pembentuk Tekstur Nugget Ikan Lele. *Agritech*, 43(2), 127-133. <https://doi.org/10.22146/agritech.69714>
- Kurniawan, D.W. (2020). Analisa Pengelolaan Pakan Ikan Lele Guna Efisiensi Biaya Produksi Untuk Meningkatkan Hasil Penjualan. *IQTISHADEquity Jurnal Manajemen* 2(1), 54-67. <https://doi.org/10.51804/iej.v2i1.552>
- Luthfiyah, A., & Anugrah, R. M. (2021). Nutritional Content of Milkfish Nuggets with Addition of Mocaf Flour. *Journal of Applied Food and Nutrition*, 2(1), 1-5. <https://doi.org/10.17509/jafn.v2i1.41828>
- Mansyur, M. H. (2022). Daya Terima Nugget Ikan Lele Dumbo (*Clarias gariepinus*) dengan Penambahan Kacang Merah. *Gorontalo Agriculture Technology Journal*, 5(1), 26-32. doi: 10.32662/gatj.v5i1.2478. <https://doi.org/10.32662/gatj.v5i1.2478>
- Mubarakah, U., Kriswantriyono, A., Horiq, H., & Syarif, R. (2021). Pemberdayaan Masyarakat dalam Pengelolaan Limbah Ikan Lele Berbasis Zero Waste (Innovation from The Bone and Head Catfish Processing for Community Empowerment in Zero Waste-Based). *J. CARE J. Resolusi Konflik, CSR, dan Pemberdayaan*, 6(1), 49-62.
- Munawaroh, S. F., & Jacob, A. M. (2020). Diversifikasi Pengolahan Ikan Lele dengan Konsep Zero Waste (Nugget dan Kerupuk)(Processing of Catfish Diversification with Concept of Zero Waste (Nugget and Chips). *Jurnal Pusat Inovasi Masyarakat*, 2(3), 417-421. Diakses di: <https://core.ac.uk/download/pdf/328047507.pdf>
- Nurhayati, I., & Siregar, A. L. (2023). Studi Komparatif Mutu Fisik Nugget Wortel Ikan Lele Di Pasaran Dan Ikan Lele Organik. *Jurnal Ilmiah PANNMED (Pharmacist, Analyst, Nurse, Nutrition, Midwifery, Environment, Dentist)* 18(2). doi: 10.36911/pannmed.v18i2.1636.
- Pudji, E., Purnamawati, E., & Yuliatin, Y. (2021). Proses Pembuatan Siomay Dari Ikan Lele Untuk Menambah Pendapatan Rumah Tangga. *Abiyasa*, 1(1), 20-25. doi: 10.33005/abiyasa.v1i1.6.
- Pujiastuti, C., & Ngatilah, Y. (2021). Penyuluhan Proses Pembuatan Patty Burger Dari Ikan Lele Di Desa Trosobo Taman Sidoarjo. *Jurnal Abdimas Teknik Kimia* 2(2). doi: 10.33005/jatekk.v2i2.36.
- Srijani, N., Riyanto, S., Hariyani, D. S., & Prastyaningrum, I. (2022). Pelatihan Kewirausahaan Melalui Kegiatan Digital Entrepreneurship Pada Mahasiswa. *J-ABDI: Jurnal Pengabdian kepada Masyarakat*, 1(8), 1707-1714. <https://doi.org/10.53625/jabdi.v1i8.740>
- Suciyono, S., Ulkhaq, M. F., Prayogo, P., Dermawan, R. R., Apriliani, D. P., Salmatin, N., ... & Istanti, D. Y. (2020). Peluang usaha budidaya ikan lele sistem akuaponik berteknologi bioflok di Desa Purwoasri, Tegaldimo, Banyuwangi. *Jurnal Medik Veteriner*, 3(1), 132-137. <https://dx.doi.org/10.20473/jmv.vol3.iss1.2020.132-137>
- Sukarjati, Pungky W.K.S, & Wibowo, T.S. (2023). Pemberdayaan Kelompok Pembudidaya Ikan Lele Di Desa Cangkring Turi Kec. Prambon Kab.Sidoarjo. *Jurnal Abadimas Adi Buana* 6(2), 129-140. <https://doi.org/10.36456/abadimas.v6.i02.a5816>
- Suroto, A. (2022). Penerapan Inovasi Mahasiswa Melalui Pengolahan Ikan Lele Dengan Prinsip Zero Waste (Studi Pada Pembuatan Produk Nugget Ikan Lele). *Jurnal Ilmiah Sistem Informasi*, 1(2), 9-18. doi: 10.51903/juisi.v1i2.361. <https://doi.org/10.51903/juisi.v1i2.361>
- Swastawati, F., Ambariyanto, A., Cahyono, B., Wijayanti, I., Chilmawati, D., Hadiyanto, H., & Al-Baarri, A. N. M. (2021). Physicochemical changes and sensory quality of liquid smoked milkfish nuggets. *African Journal of Food, Agriculture, Nutrition and Development*, 21(7), 18261-18278. Diakses di: <https://www.ajol.info/index.php/ajfand/article/view/231662>

- Wiyani, N. A. (2020). Manajemen Praktikum Kepemimpinan Dan Renstra Berbasis Pengabdian Kepada Masyarakat. *Dimasejati: Jurnal Pengabdian Kepada Masyarakat*, 2(1), 1-18. doi: 10.24235/dimasejati.v2i1.6463.
- Yusuf, N., & Musali, F. (2021). Karakteristik mutu hedonik dan proksimat nugget ikan lele dumbo (*Clarias gariepinus*) menggunakan tepung biji durian (*Durio Zibethinus murr*). *Jambura Fish Processing Journal*, 3(1), 38-45. <https://doi.org/10.37905/jfpj.v3i1.9758>