

# Technology dissemination of smart tani fish farmers in karang kepanjen hamlet, trimulyo village, sleman district, sleman regency

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## ABSTRACT

Smartani "Fish Farming SMEs" is located in an agricultural area in Sleman Regency, precisely in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Yogyakarta Special Region has been conducting tilapia cultivation activities since 2012. Smartani fishery cultivation is led by Mr. Bondan Widoropeksi. In fact, Mr. Bondan Widoropeksi has a large enough market opportunity for aquaculture. However, this opportunity brings consequences and problems, namely the lack of a touch of innovation from the fish feeding system. Information about some of the problems faced by fish farming must be addressed as soon as possible as a solution for developing aquaculture business. Through this proposed science and technology activity program and based on the needs analysis that has been carried out, the service team tries to offer solutions to these problems with a touch of science and technology, namely through the main activity of designing remote fish feeders with IoT technology. This remote fish feed technology uses Arduino type microcontroller technology which is equipped with remote communication technology using GSM modules. The schedule of fish feeders and the dose of the amount of feed needed by the fish can be set automatically and remotely using IoT technology.

## KEYWORDS

Microcontroller;  
GSM;  
Fish Farmer;  
Fish Feed;  
IoT;  
Marketing



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## 1. Introduction

Karang Kepanjen Hamlet has a small business fish farming farmer, namely Smartani. Smartani "Catfish Farmer UKM" is located in an agricultural area in Sleman Regency, precisely in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Yogyakarta Special Region has been conducting tilapia cultivation activities since 2012. Smartani fishery cultivation is led by Mr. Bondan Widoropeksi. Tilapia chicks can be obtained in the area around the location of Sleman Regency. Tilapia culture nursery systems such as feeding tilapia, maintaining temperature, water content, humidity, and light intensity in fish ponds are still manual. The treatment for tilapia cultivation includes adjusting the intensity of the light by installing mosquito nets, and the humidity in the tilapia pond by checking visually. These SMEs have the ability to harvest fish every three months and have a large enough market opportunity. However, this opportunity brings consequences and problems, namely the lack of a touch of innovation from aquaculture. With these problems, a touch of innovation was made by referring to fisheries research [1].

Several fisheries studies used for reference by previous researchers include calculating the condition of fish in assessing the reproduction of sea eels to achieve fisheries sustainability studied by Mu [1]. China's policies and practices in combating IUU in aquatic fisheries are much researched by Shen [2]. Responsible fishing operations for clean seas, healthy ecosystems, and sustainable fisheries are researched by He [3]. Co-management of small-scale fisheries in Tonle Sap Lake, Cambodia was investigated by Sok [4]. The socio-economic monitoring and evaluation of fisheries was investigated by Bennett [5]. The modeling of entanglement rates for estimating seabird mortality in the British Columbia commercial salmon gillnet fishery was studied by Bertram [6]. Measuring capacity utilization in fisheries using physical or economic variables: Envelope analysis of Vietnam's ring trawl fisheries data was investigated by Cao [7]. Inland fisheries are important for the food quality of children in sub-Saharan Africa studied by O'Meara [8]. Oil, fisheries and coastal communities: An overview of impacts on the environment, livelihoods, space and governance researched by Andrews [9]. Ecosystem dynamics modeling to assess the effect of coastal fisheries on cetacean species was studied by Giralt Paradell [10]. What data from commercial fisheries in the Great Lakes can reveal about the ecology and management of juvenile sea lampreys studied by [11].

Balancing ecology, economy and culture in fisheries policy: Participatory research in the Western Mediterranean demersal fisheries management plan was investigated by Gómez [12]. Lamprey Fisheries: History, trends, and management researched by Almeida [13]. Ecosystem-based fisheries management is achievable, affordable, and should be seen as a long-term commitment: Experience from Lake Vttern, Sweden researched by Bryhn [14]. International politics must be considered along with climate and fisheries regulations as drivers of marine ecosystems studied by de Carvalho-Souza [15]. Towards transparent transboundary fisheries governance: The case of Pacific tuna transshipment researched by Seto [16]. Special topic – Fisheries monitoring: Eyes on the sea: An innovative and multidimensional solution for monitoring fisheries was researched by Chang [17]. The effect of marine fisheries monitoring on science, management, and fleet dynamics was investigated by Kritzer [18]. The ebb and flow of adaptive co-management: A longitudinal evaluation of conservation conflicts was investigated by Cox [19]. Assessing the potential protective effect on commercial fish species in the Cuban MPA was studied by Horta e Costa [20]. Themes that emerged in support of Britain's ambitious conservation of marine biodiversity were investigated by Rees [21].

Some of the reproductive and biometric features of the endangered Gangetic Leaf Fish and their implications for baor fisheries management in Bangladesh were investigated by Hasan Mredul [22]. Size selectivity and catching efficiency of bottom trawls with double-slit and diamond mesh pockets in the Northeast Atlantic gadoid fishery were studied by Brinkhof [23]. The effect of 3D seismic surveys on snow crab fisheries was investigated by Morris [24]. The quantification of gear damage in haddock trawl caught in the Northeast Atlantic fishery was investigated by Sistiaga [25]. Transparency in global fisheries governance: The role of non-governmental organizations is researched by Petersson [26]. The National Action Plan (NPOA) to reduce seabird bycatch was investigated by Good [27]. Fisheries management tools to support coastal and marine spatial planning: A case study from the Gulf of Northern California, Mexico researched by Morzaria-Luna [28]. The catch with global fisheries was investigated by Worm [29]. The evolution of fishing capacity in Mediterranean fisheries in the first two decades of the 21st century c was investigated by Maynou [30]. Northwest Atlantic Fisheries Organization Roadmap for the development and implementation of an Ecosystem Approach to Fisheries: structure, state of development, and challenges researched by Koen-Alonso [31].

Ecology and spawning times of black sea bass in Lake Ontario and the St. River. Lawrence: Potential interactions with fishing season were investigated by Tufts [32]. Worldwide decommissioning of oil and gas platforms: An overview of reef practices and options researched by Bull [33]. The perspective of legal pluralism of coastal fisheries governance in two Pacific Island countries was investigated by Rohe [34]. Noting the status of implementation of the Voluntary Guidelines for Safeguarding Sustainable Small-

Scale Fisheries: A country-level assessment framework researched by Courtney [35]. An ecosystem-based risk assessment for California fisheries developed jointly by scientists, managers, and stakeholders was researched by Samhoury [36]. Community-level effects of spatial management in the California drift gillnet Fishery were investigated by Mason [37].

The problem that occurs in SMEs of tilapia aquaculture farmers is the process of feeding fish manually. Information regarding the problems faced by MSMEs must of course be addressed as soon as possible as a solution for developing aquaculture business. Through this proposed science and technology activity program and based on the needs analysis that has been carried out, the contribution of the service team is to try to offer solutions to these problems with a touch of science and technology, namely through the main activity, namely remote fish feeder with IoT technology. This technology uses an Arduino type microcontroller which is connected to remote communication technology using IoT technology. The microcontroller will be connected to the GSM module for remote communication.

## 2. Method

The activity plan in order to implement the solutions offered is shown in detail in Fig. 1. The figure shows that the method of activities includes site surveys, manufacture of fish feeders, installation of fish feeders, and maintenance of equipment. The first activity is a site survey that aims to find out the problems faced by partners. The problem faced by partners is the process of feeding fish. In the process of feeding the fish must be evenly distributed throughout the pond. The second activity is the manufacture of automatic fish feeders. This activity aims to make an automatic fish feeder. The manufacture was carried out in the workshop of the electrical engineering department of the University of Muhammadiyah Yogyakarta involving several students and technicians. The third activity is an automatic fish feed installation activity. The installation of this automatic fish feeder is assisted by KKN students and engineering lecturers who have knowledge of catfish farming. The last activity is equipment maintenance. The maintenance of this automatic fish feeder is assisted by KKN students and engineering lecturers who have knowledge of catfish farming.

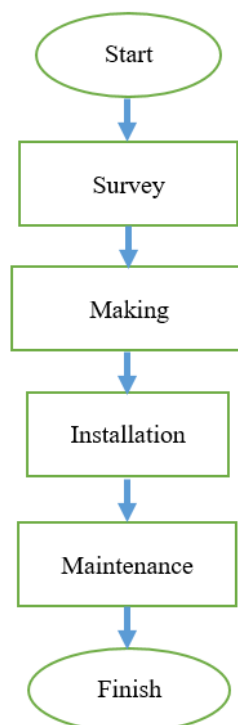


Fig. 1. Activity sequence method

### 3. Results and Discussion

This community service activity program involves Smartani partners "Catfish Farmer SMEs" located in agricultural areas in Sleman Regency, precisely in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Special Region of Yogyakarta. The first step in this program is an initial site survey with the aim of knowing the problems and potentials that exist in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Yogyakarta Special Region. The initial site survey was carried out on 20 February 2021 and was followed by the entire team. service from UIN Sunan Kalijaga, service team from UMY, service team from UAD, and the UMY Community Service Team as shown in Fig. 2.



**Fig. 2.** Initial location survey

From the picture, it can be seen that the hamlet of Dusun Karang Kepanjen, Trimulyo Village, Sleman District, Sleman Regency, Yogyakarta Special Region has catfish farming SMEs which are still managed manually and lack a touch of innovation for catfish farming. Fish breeding systems such as maintaining the temperature, water content, humidity, and light intensity of fish are still manual. The aquaculture care they do includes adjusting the intensity of the light by installing mosquito nets, regulating the temperature of the pond by providing a tarpaulin cover. Information about some of the problems faced by fish farming must be addressed as soon as possible as a solution for developing aquaculture business. After the problem is known, the next step is to coordinate with partners about the problem by socializing the science and technology touch, namely through the main activity of designing remote fish feeders with IoT technology.

In this coordination, a mutual agreement has been reached to carry out community service activities according to the process and time of implementation. This agreement is an important commitment for the success of community service activities with the superior product "manufacturing remote fish feeding equipment". The manufacture of remote fish feeding equipment has been carried out on February 1, 2021 to February 20, 2021 which was carried out by the entire service team, partners, and the UMY Community Service Team as shown in Fig. 3. From this picture, the socialization of making fish feed equipment was carried out by Nia Maharani Raharja ., ST, M.Eng., Information Technology lecturer at UIN Sunan Kalijaga Yogyakarta and Dr., Ir., Iswanto., ST, M.Eng., IPM lecturer in the UMY Engineer Profession Program assisted by Dhiya Uddin Rijalussalam ST staff from Electrical Engineering UMY.



**Fig. 3.** Socialization of equipment installation on site

After the socialization activity on the installation of tools at Smartani partner "UKM catfish farmers" located in an agricultural area in Sleman Regency, precisely in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Yogyakarta Special Region, continued with the installation on 20 February 2021 and followed by the entire service team, partners, and the UMY KKN team is shown in Fig. 4. From the picture it can be seen that Mr. Bondan as the owner of the Smartani catfish farmer UKM gave directions to install fish feed equipment carried out by the community service team led by Nia Maharani Raharja., ST, M.Eng., lecturer of the Information Technology Program at Sunan Kalijaga State Islamic University, Yogyakarta.



**Fig. 4.** Tool installation

After the tool installation activity at Smartani partner "UKM catfish farmer" took place in an agricultural area in Sleman Regency, precisely in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Yogyakarta Special Region, continued with equipment maintenance on 25 February 2021 and followed by the entire service team, partners, and the UMY Community Service Team, shown in Fig. 5. From the figure it can be seen that the maintenance of mushroom monitoring tools is carried out by the community service team.



**Fig. 5.** Tool maintenance

#### **4. Conclusion**

The conclusions that can be drawn from the PKM activity for community empowerment in installing tools at Smartani partners "Catfish farmers" located in agricultural areas in Sleman Regency, precisely in Karang Kepanjen Hamlet, Trimulyo Village, Sleman District, Sleman Regency, Special Region of Yogyakarta are as follows: (1) the initial site survey was conducted on February 20, 2021 and was attended by the entire service team, and the UMY Community Service Team. (2) The manufacture of remote fish feeding equipment has been carried out from February 1, 2021 to February 20, 2021, which was carried out by the entire service team, partners, and the UMY Community Service Team. (3) Installation of fish feed equipment on February 20, 2021 and participated by all service teams, partners, and the UMY Community Service Team. (4) Maintenance of mushroom temperature and humidity monitoring equipment on 25 February 2021. The output of the activity is in the form of remote fish feeding equipment.

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#### **Author Contribution**

All authors contributed equally to the main contributor to this paper. All authors have read and agreed to the published version of the manuscript

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#### **Conflict of Interest**

The authors declare no conflict of interest.

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