Smart Agriculture Training to Increase Fish Productivity in Padamulya Ciamis Village, West Java, Indonesia

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Abstract:

The main problem of Padamulya Village is the lack of a technology utilization system in the field of fisheries. Fish farming systems still use conventional, so that monitoring of fish quality is limited in time and place. The main purpose of this service is to provide knowledge to the community related to smart agriculture technology in the fisheries sector in Padamulya Village to increase quality fish production. The training activity was held on December 10, 2019 in the Hall of the Muhammadiyah University of Tasikmalaya. The results of this service show that the community is starting to have knowledge and provide land to make ponds with smart agriculture technology.

Keywords: Internet of Thing, Smart agriculture, community services

1. Introduction

Padamulya Village is one of the villages located in Cihaurbeti District, Ciamis Regency. West Java. This village has an area of 286.45 hectares of rice fields with semi-technical irrigation because it is located in a lowland area and the yard area is 275 hectares. The main sources of community income are agriculture, fisheries and plantations. One of the village incomes in an effort to increase income is tilapia cultivation. This is indicated by the number of tilapia ponds in the community, but they have not been managed properly (Rostika, 2014; Dadi, 2020; Isyanto et al., 2021; Maemunah, 2021).

The main problem of aquaculture in the Padamulya village is the pond management system which is still conventional, not yet at the stage of technology integration with the internet or known as the Internet of Things. The coaching team from the University of Muhammadiyah Tasikmalaya encouraged the conventional fisheries sector to quickly shift to digital in order to respond to various challenges and increasingly diverse and increasing consumer demands (Hani et al., 2018; Pasaribu et al., 2021; Ula et al., 2020; Patria and Sambas, 2021).

The main objective of this smart agriculture training in the fisheries sector is business efficiency and technology transfer which has an impact on cost efficiency and work safety due to sensors and communication tools so as to minimize accidents. Smart agriculture is an effort to increase fish production and the digital transformation of fisheries must not fail because it shows a paradigm shift and transformation of fisheries from traditional ways to modern ways through smart agriculture. Digitization of the fishery sector is becoming effective and the use of mechanization is getting more advanced so that production continues to increase with high quality and income increases.

Many studies related to smart agriculture that focus on fisheries have been discussed by various world scientists. Zougmoré et al. (2016) presented smart agriculture technology investigation in west Africa for the livestock, fishery and crop production sectors. Ahmed and Solomon (2016) investigated climate smart aquaculture as veritable approach to increasing fish production in the face of climate change trend in Nigeria. They show that the climate change will have significant impacts on fisheries and aquaculture in Nigeria. Also, climate smart aquaculture will respond to these changes by boosting adaptive capacity and resilience both of communities. Balakrishnan et al. (2019) proposed a framework for developing an exceptionally beneficial aquaculture framework, equipped for preparing the employments of observing, wise control of the Internet of thing (IoT), irregularity mindfulness, and carbon outflow decrease just as vitality protection. This technology makes it easy for farmers to monitor fish quality and productivity in real time in India.

After this service activity, the community in Padamulya Village is expected to be able to optimize fish cultivation by using information technology to support these fishery activities. Therefore, the main objective of this study is to provide knowledge to the community related to smart agriculture technology in the fisheries sector in Padamulya Village to increase quality fish production.

2. Material and Method

This service activity was carried out in Padamulya village, Cihaurbeuti District, Ciamis Regency in October-December 2019. The implementation of the activity is carried out with workshop activities involving the community and coordinating with the local village government. The main objective is problem identification, problem solving formulation, as well as in implementation to evaluation.

The methods used in this work are focus group discussions, workshops with expert resource persons in the field of fisheries technology, training and mentoring periodically, evaluating and monitoring activities. The skill level of the trainees is measured through the implementation of the proper use of fish ponds groups and implementation of the use of information technology. A competitive approach is used to motivate participants to make optimal use of the fish pond. Figure 1 shows the method of implementing community service activities for smart agriculture.

Focus Group Discussion	→	Workshop	→	Expert Technology	→	Monitoring and Evaluation

Figure 1. Methodology of community services

In its implementation, smart farming involves 6 technologies (Jayaraman et al., 2016; Boursianis et al., 2022):

a. Sensing technology, intelligent sensor technology is used to determine the actual soil content from moisture, water content and temperature management. All are integrated with internet of thing (IoT) technology which allows farmers to monitor land conditions without having to go directly to the land.
b. Software application, this application can make it easier to manage, process data and information generated from intelligent sensor devices. Its function is as an interface for farmers to make the data easier to read and understand.
c. Communication technology, mobile telecommunications devices can be used to transmit information related to the condition of agricultural land and as a reminder of agricultural activities.
d. GPS technology, GPS devices can be used for land mapping. GPS receives signals from satellites orbiting the earth and then used for navigation of agricultural equipment. Starting from knowing the location of land that has been or has not been fertilized to knowing the productivity of a land.
e. Hardware, hardware helps work automatically and scalably, such as robots or drones. This is done to increase the efficiency and effectiveness of production facilities.
f. Data analysis, all on-farm data will be thoroughly analyzed by the application system and used as a reference for decision-making and future agricultural predictions. The results of the analysis can also be used by farmers to find solutions with agricultural cultivation.

3. Results and Discussion

Before the mentoring activities in the assisted villages were carried out, observations and mapping of problems were carried out regarding the use of smart agriculture technology in the fisheries sector. Potential observations were carried out by conducting discussions with village officials regarding the potential of fisheries in Padamulya Village and potential uses Internet. Potential observations were also carried out to determine the potential of Village-Owned Enterprises (BUMDES) in contributing to smart agriculture-based tilapia cultivation.

The results of potential observations found that the use of smart agriculture technology in the fisheries sector has not been carried out optimally. On the other hand, the extent of fish ponds that have not been used optimally is still very large due to being abandoned by their owners who move or work to urban areas. In fact, the fish pond has enormous potential because of the water source.

In the first part, the workshop resource persons explained about superior tilapia species such as Best tilapia, Gesit, Srikandi, Larasati, Anjani and Jica, In the second part, the resource persons explained about selecting fish seeds, preparing ponds for tilapia cultivation, sowing tilapia seeds, raising tilapia, managing water, feeding tilapia, controlling pests and diseases from tilapia and harvesting tilapia. The workshop activities at Bumdes Mulyajaya Ciamis can be seen in Figure 2.

(a)

(b)

Figure 2. Workshop activities at Bumdes Mulyajaya Ciamis

For the introduction of technology 4.0. resource persons explained related to technological developments in industry and agriculture (Castañeda-Miranda and Castaño-Meneses, 2020; Debauche et al., 2021). This section describes the changes in conventional technology towards digital technology. Furthemore, we explain the differences related to smart agriculture and precision agriculture. In its development, smart agriculture technology is supported by 6 components, namely: sensing technologies, software application, communication system, telematics and positioning technologies, hardware and software system and data analytic solution (Islam et al., 2021; Awan et al., 2019).

In addition, we also explain the application of intelligence artificial intelligence that produces a model or system through learning process on data. The process of "learn from data" is carried out without direction from the user. Also, with machine learning, computers can modify or adapt their behavior or actions, so that behavior and the action become more accurate (Ronaghi and Forouharfar, 2020; Verma et al., 2020).

4. Conclussion

Smart Faming Precision Agriculture 4.0 is a technology that has not been fully implemented in Indonesia, of course there will be many difficulties to get to know this technology. To overcome this, we must be patient and continue to learn to adopt this technology independently or in countries that have successfully implemented it. In essence, it takes a lot of time, requires perseverance and strong intentions.

In practice, in the field, the smart farming precision agriculture method combines an IoT (Internet of Things)-based platform with agricultural tools and machines (alsintan). Of course, in order for this to be in harmony, agricultural production equipment is no longer operated conventionally but controlled by technology, therefore agricultural machinery must be upgraded or upgraded.Upgrading agricultural equipment here can be in the form of combining 2 devices that are assembled based on needs or adding technology to a device (eg adding sensors, GPS, wifi, etc.) so that it is compatible with the appropriate platform.

In this paper, we have provided knowledge to the community related to smart agriculture technology in the fisheries sector in Padamulya Village to increase quality fish production. The training activity was held on December 10, 2019 in the Hall of the Muhammadiyah University of Tasikmalaya. The results of this service show that the community is starting to have knowledge and provide land to make ponds with smart agriculture technology.

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