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Implementation of Smart Agrologistics in Fish Wrapped in a Banana Leaf Business to Increase the Income of Freshwater Fishermen Post-Covid19

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ABSTRACT

Fish wrapped in a banana leaf is one of the processed fish commodities caught by superior fishermen from Wadaslintang, Central Java. After COVID-19, several obstacles emerged at the Wadaslintang Fish Craftsmen, namely the procurement of raw materials for red tilapia (Oreochromis niloticus) and the marketing of the products. Its activity aims to apply innovative agrologistic technology with a spatial database. Activities were carried out for eight months for 15 KUB members. The method of implementing the activity is interviews and implementation of segregation and georeferencing digitization of the distribution of quality raw material providers, potential market segments, and optimization of marketing area coverage. The results of the implementation of activities show that this technology can be applied well to build a productive fishing community civilization. The number of new business ventures increased from 15 to 20 members, marketing reach expanded to Semarang, and production increased from 60kg/day to 150kg/day.

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INTRODUCTION

Erorejo Village, Wadaslintang District, Wonosobo Regency has an area of 6.85 km2 located at 7^{0}34'S and 109^{0}48'E and is divided into two regions, namely the Windusari highlands and the lowlands around the Wadaslintang reservoir. The geographical conditions make growing agricultural commodities such as Arabica coffee, coconut, cloves, and cardamom possible. Meanwhile, the Wadaslintang reservoir is the livelihood center for 15-20% of its residents as freshwater fishermen. The Lubang Sewu, a natural tourist attraction, is known as the Little Green Canyon in Indonesia. Red tilapia *(Oreochromis niloticus)* is a fish from the Cichlidae family. This fish has a striking bright red color and a beautiful and elegant body shape (Lintang *et al*., 2016). This fish is the result of a cross between fish from the Cichlidae family from the descendants of *Oreochromis mosambicus* and *red O. honorum* originating from Singapore and red Oreochromis niloticus originating from Japan (Gunadi & Robisalmi, 2016; Djaelani *et al.,* 2022; Ayu *et al*., 2024). Red tilapia is mainly used as an ornamental fish because of its small body shape and beautiful colors. There is quite a lot of post-harvest diversification; it can be sold in the form of fresh fish, smoked fish, fish wrapped in a banana leaf, and salted fish (Sarofa *et al*., 2014; Febriyanti *et al*., 2023). Smoked fish and fish wrapped in a banana leaf are a processed fish commodity caught by fishermen (Marom *et al*., 2015; Yusianto *et al.,* 2023).

In 2023, the population of Erorejo will be 981 people. One hundred fifty-seven heads of families (16%) are members of the Widoseger and KWT Rahayu farmer groups. The two portions are the Rahayu Joint Business Group members (KUB) located at Jurutengah hamlet, RT 10 RW 03 Erorejo, with chairman Eti Sri Mulyati, a partner in this assisted village empowerment program. Erorejo Village is one of the producers of red tilapia freshwater fish commodities. This commodity is produced from the Wadaslintang reservoir, with 105 heads of families who work as freshwater fishermen. KUB Rahayu's average production is currently 300 kg/month of red tilapia, which is sold fresh. The results of discussions with the KUB chairman, a partner in this program, showed that production before COVID-19 averaged 60 kg of fish wrapped in a banana leaf with two quintals/day of raw materials. The marketing area is mostly still in Wonosobo (Figure 1).

FIGURE 1. Discussion of partner problems

After the COVID-19 pandemic, several obstacles have arisen, namely procurement of quality raw materials and marketing of production results (Anik & Wasitowati, 2024). Most KUB members still need to know how to integrate tilapia production into superior products with high selling value, sustainable production, and good marketing, including new business diversification, namely tilapia cultivation, which has good prospects.

Therefore, in empowering this assisted village, several KUB business development activities are implemented through cultivation, production, and post-harvest handling so that it is hoped that these fish wrapped in a banana leaf will become Wadaslintang superior product based on an intelligent decision

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support system. This system, referred to as the 'intelligent green spatial agrologistic application ', is a novel approach that uses spatial data to optimize the agrologistic process (Wiryawan *et al.,* 2020)(Yusianto, 2022). With this application, it is hoped to increase sales transactions in the new integrated fish wrapped in a banana leaf business to build a productive fishing community civilization.

METHODS

The sample for this activity was 30 freshwater fishermen using simple random sampling techniques. Data collection techniques using in-depth discussions and interviews. Based on the results of discussions and interviews with the chairman and members of the Wadaslintang Fish Craftsmen and Management KUB, the COVID-19 pandemic has impacted business sustainability. Apart from marketing, raw materials of quality fish are also challenging to obtain. The method for implementing activities carried out in the community empowerment program in the Empowerment of Assisted Villages is to carry out segregation using a Geo Segregation Analyzer to obtain statistical information based on a spatial database. This spatial database, referred to as the 'bright green spatial database ', is a cutting-edge tool that provides real-time data on the distribution of quality raw material providers and potential market segments (Yusianto *et al.,* 2020; Hardjomidjojo *et al.,* 2022). The final product is a decision support system that can help KUB members start businesses based on valid database-based data.

Currently, KUB does not use an information system to increase sales transactions, and production capacity still needs to improve, namely a maximum of 60 kg per process with only two quintals of raw materials per day. Most KUB members need to learn about the integrated fish wrapped in a banana leaf system, starting from cultivation, production, post-harvest handling, good distribution, and marketing. Most members only produced and sold fish wrapped in a banana leaf in the form and packaged as is (Figure 2).

FIGURE 2. Activities of Wasalintang fish craftsmen and managers

Post-harvest processing can be further optimized by vacuum packaging techniques, product labeling, and database-based marketing systems, including online marketing, which is developing rapidly. The Wonosobo Regency Government, through the Agricultural Food and Fisheries Service, has allocated an APBD budget for creating this business, one of which is through training and counseling activities. However, efforts to optimize the role of KUB in disseminating the fish-wrapped productivity program to become a superior commodity have not yet been reached, so activities are needed to increase production capacity based on an intelligent decision support system using a spatial database, including the distribution of breeders, breeders of quality raw materials, potential market segments and marketing area coverage.

This activity refers to the priority of preparing/strengthening marketing with information systems. This activity has designed a smart green spatial agrologic building based on an intelligent decision support system by the Industrial Revolution 4.0 era. This activity aims to implement several KUB business development activities through a new integrated fish wrapped in a banana leaf business based on an intelligent decision support system. This move is expected to significantly increase sales transactions and

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build a civilization of productive freshwater fishing communities. The methods and stages of implementing this activity are shown in Figure 3.

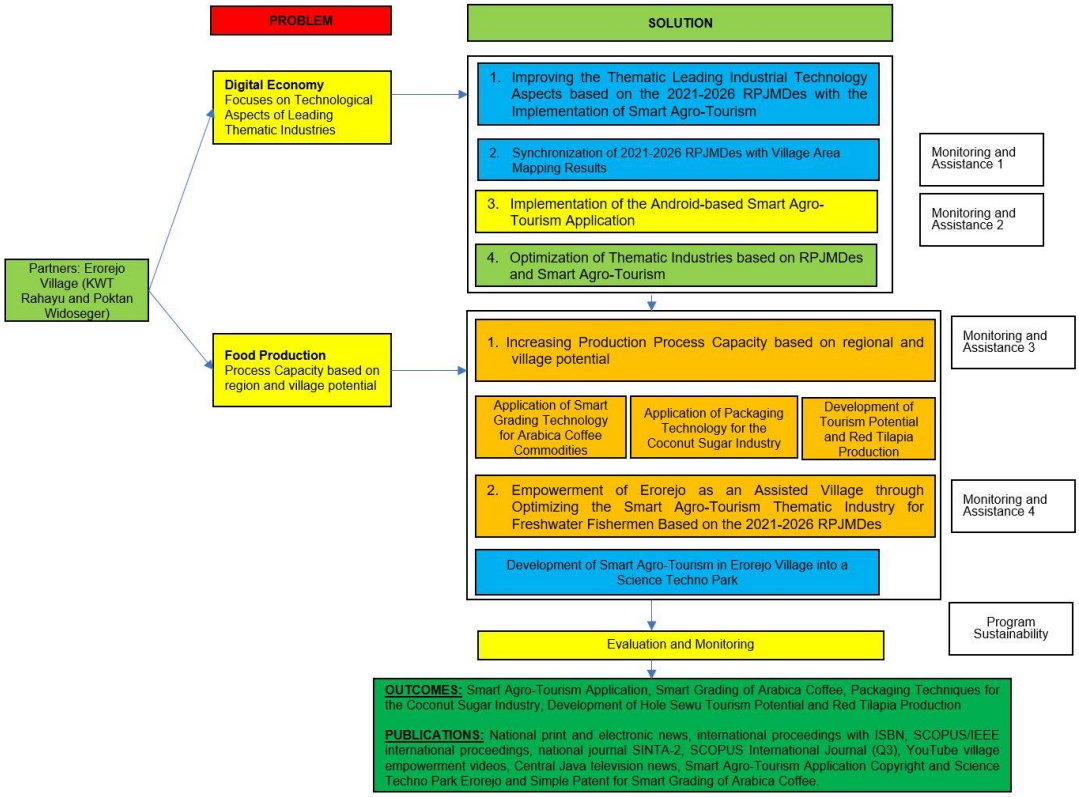

FIGURE 3. Stages of activity implementation

Apart from that, there are several results, including:

1. Improving Marketing Technology Aspects by Developing an Information System based on an Intelligent Decision Support System using a Spatial Database. With its intelligent decision support system, this system will play a crucial role in providing real-time insights, optimizing decision-making processes, and enhancing operational efficiency. The introduction of an integrated business, starting with the catfish supplier, production process, and post-production, as well as a database-based marketing system, including online marketing, will further contribute to this efficiency. The developed database considers the spatial environment. With this application, it is hoped that KUB's self-reliance will increase with an appropriate technology development program, namely with the knowledge and skills to be able to handle good production using a database base so that production can increase from 2 quintals/day of raw materials to 5 quintals/day.
2. Activities to increase Production Capacity and Marketing Reach using a database. With an information system based on intelligent decision-making using a spatial database to distribute quality raw material suppliers, potential market segments, and marketing area coverage, we anticipate a significant increase in production capacity to 150kg/day. This promising projection should instill optimism about the proposal's potential impact on KUB's operations. Marketing reach is increasingly more comprehensive, covering all regions in Central Java.

RESULT AND DISSCUSION

The results of the activities show the success of the activities for partners, namely:

1. Aspects of marketing/distribution technology, Wadaslintang Fish Craftsmen and Managers KUB members have been able to use the intelligent green spatial agrologistic application based on a mobile

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application equipped with spatial maps. Indicators of target achievement are (a) Increase in the number of new fish wrapped in a banana leaf business ventures from 15 groups of artisan fishermen and fish managers who are members of KUB to 25 members of KUB; (b) Increased marketing reach extends throughout Central Java.

2. In the aspect of increasing technological capacity (production process), members of the Wadaslintang Fish Craftsmen and Managers KUB can implement an intelligent decision support system based on a database of the distribution of quality raw material suppliers, potential market segments, and marketing area coverage. Indicators of target achievement are: Increased production from 60kg/day to a minimum of 150kg/day. The achievement indicators for applying technology to SMEs can be seen in Figure 4.

This activity has successfully implemented the intelligent green spatial agrologistic technology product architecture for developing a new integrated fish paste process business, starting from suppliers, production, and post-production using a spatial database approach. The distribution of quality raw material suppliers, potential market segments, and coverage of marketing areas is depicted in the Geographic Information System (GIS).

The final product is an intelligent decision support system in the form of smart green spatial agrology, which can help KUB members develop a new integrated smoked fish business by sourcing valid data based on a spatial database. With this intelligent green spatial agrologistic application, KUB can increase sales transactions in the new integrated smoked fish business as an effort to build a productive fishing community civilization. This activity has also collected a spatial database of fish distribution wrapped in banana leaf craftsmen, suppliers of quality raw materials, potential market segments, and marketing area coverage, designing a spatial database, compiling layers, and creating an Android-based application (Figure 5).

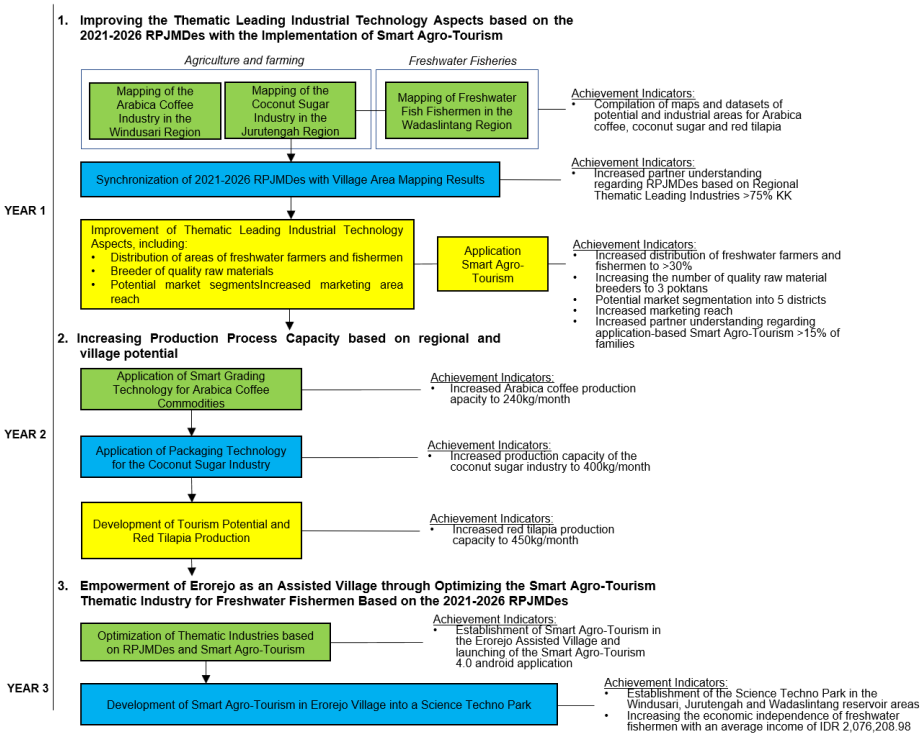

FIGURE 4. Achievement Indicator Chart

This activity has also succeeded in segregating using Geo Segregation Analyzer and georeferencing digitizers using ArcMap to obtain statistical information on spatial data.

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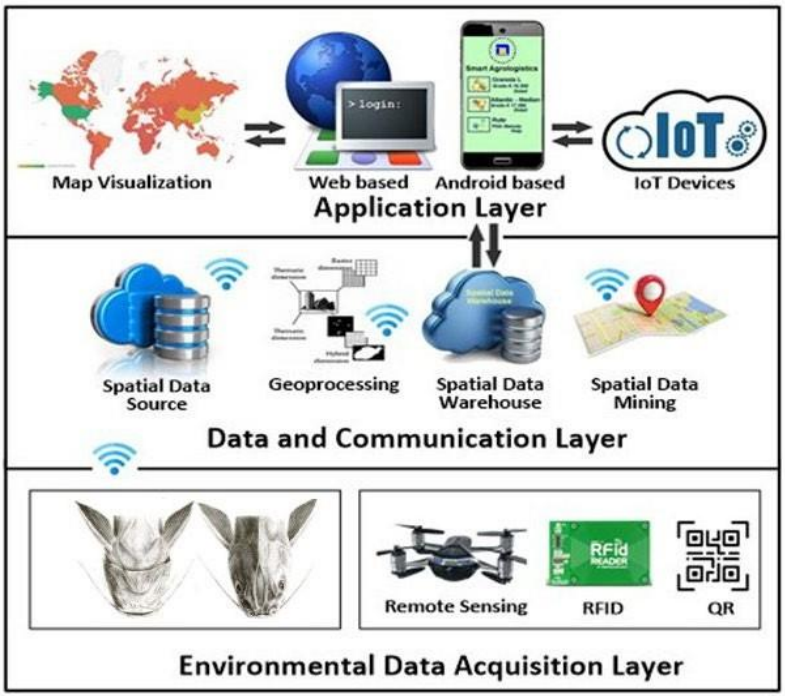

FIGURE 5. Application layer created

This activity has also succeeded in mapping spatial areas, which is the initial part of introducing an integrated business, starting from tilapia cultivation and post-harvest handling using online media, production processes, and database-based marketing systems, including online marketing.

Area-based activities consider the spatial environment. The intelligent green spatial agrological application was designed in this activity based on spatial area mapping. KUB's self-reliance will likely increase with an appropriate technology development program (Figure 6).

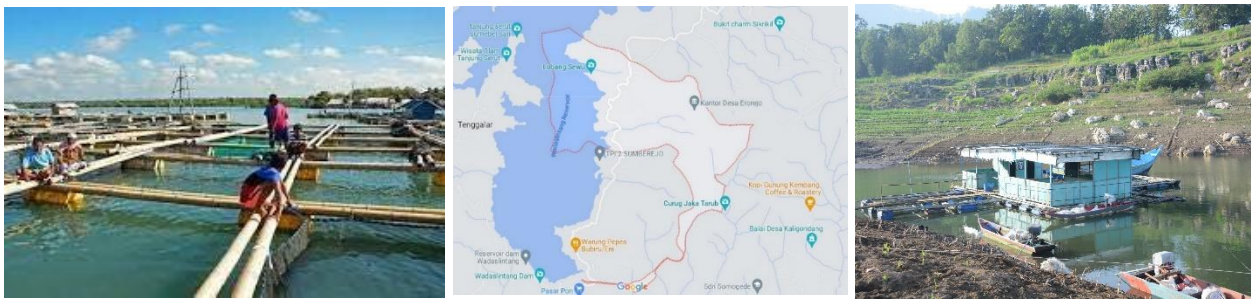

FIGURE 6. Spatial area mapping

Knowledge and skills to handle production well using a database base so that production can increase from raw materials from 2 quintals/day to 5 quintals/day. The fish wrapped in a banana leaf process is the most crucial series of activities in this fish wrapped in a banana leaf business.

In this activity, the fish wrapped in a banana leaf process was analyzed by observing and conducting field studies on several fish wrapped in a banana leaf by craftsmen in Wadaslintang. The process of wrapping the fish in a banana leaf begins with providing raw materials. The technology implemented for partners is in the form of an intelligent decision support system for the new integrated fish, which is wrapped in a banana leaf process business as an effort to build a productive fishing community civilization. This decision support system is designed to identify needs, thereby considering program sustainability. This Android-based system consists of 3 modules: User Management, ISDSS and Interface. The application mockup sample is as follows (Figure 7).

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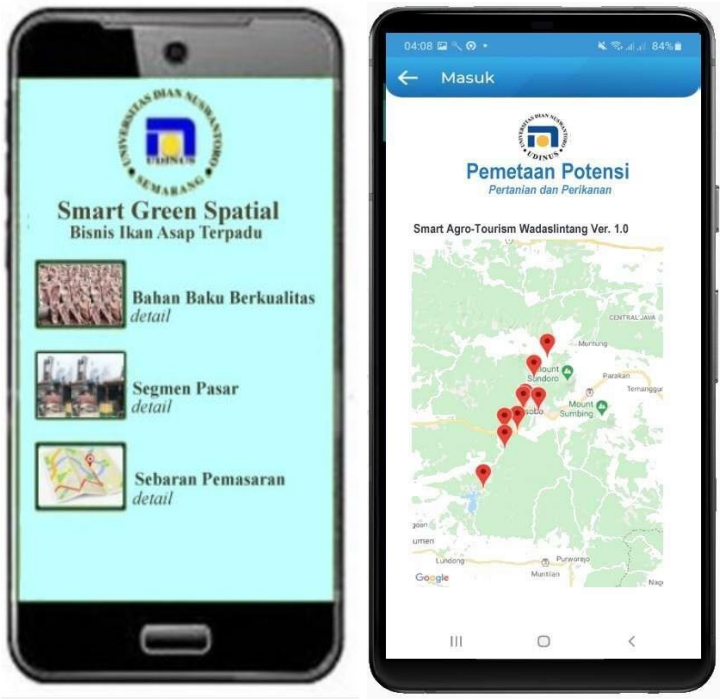

FIGURE 7. Application start page

Apart from that, the implementation of this activity was supported by the Agricultural Food and Fisheries Service Wonosobo Regency by collaborating to add financial literacy material. So that the technological aspects provided to partners are more complete by adding economic elements (Triwibowo *et al.*, 2024). Through the initial stages of program implementation, discussions, in-depth interviews, and socialization, the interest of Wadaslintang Fish Craftsmen and Managers KUB members has increased. The following is a graph of the readiness of KUB members before and after the program was implemented.

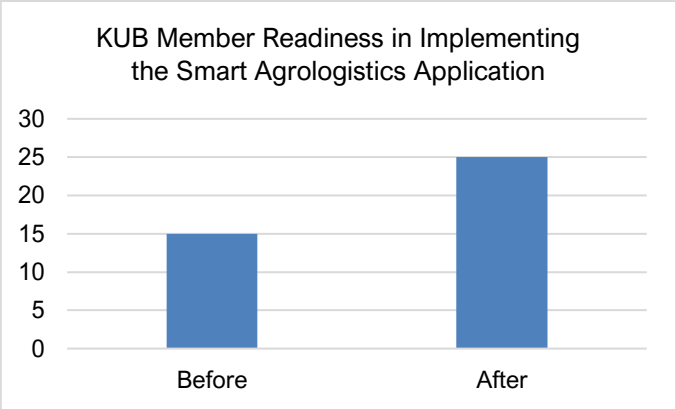

FIGURE 8. Graph of KUB member readiness

Based on initial interviews, of the 15 KUB members, five members are ready to use this application. Meanwhile, the rest are currently focused on improving marketing. Marketing reach began to spread outside Wonosobo, namely Semarang.

RESULT AND DISSCUSION

We have succeeded in developing an intelligent green spatial agrological technology architecture for developing an integrated fish paste process business, from providing raw materials, production, and marketing with a spatial database approach.

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The results of the implementation of activities show that innovative green spatial agrological technology can be applied well to build a productive freshwater fishing community civilization. The number of new fish wrapped in a banana leaf business venture and those wrapped in a banana leaf process increased from 15 to 20 KUB members, marketing reach expanded to Semarang, and production increased from 60kg/day to 150kg/day.

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