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THE ETHNOECONOMIC ASSESSMENT OF MINA RICE FARMING DEVELOPMENT IN SOUTH KONAWE DISTRICT

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ABSTRACT

This research examines the ethnoeconomics of Mina Padi farming development in the lebak swamplands with a focus on the local wisdom of the Bugis community. The aim was to understand the economic value and benefits that farmers gain through this practice. The research took place from March 2023 to February 2024 and involved 75 Mina Padi farmers and key informants such as village heads and farmer group leaders. Data were collected through in-depth interviews, field observations, and documentation. The approach used was mixed methods, combining qualitative and quantitative analyses within an ethnoeconomic framework to explore the economic, social, and cultural dimensions of Mina Padi farming. The results showed that farmers have inherited traditional rice and fish farming knowledge from their ancestors, which is now combined with modern technology. This process includes land cultivation, planting, maintenance, and post-harvesting, which is carried out with attention to ecological and economic aspects. Economically, Mina Padi farming provides important benefits in income diversification and food security for farming families through fish and rice supplies. This research confirms that the collaboration between local wisdom and modern technology has great potential to improve farmers' welfare and agricultural sustainability in lebak swamplands. The findings are expected to be valuable inputs for policymakers and sustainable agricultural development programs.

Keywords: ethnoeconomy; lebak swamp; mina padi; sustainable agriculture.

INTRODUCTION

Agriculture is one of the crucial economic sectors for developing countries, including Indonesia, where most of the population is still dependent on this sector (Hidayah et al., 2022; Meyer, 2019; Bukhtiarova et al., 2019). Despite its vast agricultural potential, Indonesia is also faced with various challenges, such as climate fluctuations (Agustin et al., 2024), land degradation (Hamid and Maharani, 2023), and increasing demand for rice and fish in line with population growth (Jiuhardi, 2023; Rahmawati et al., 2023). In this context, conventional agricultural practices often can no longer fulfill food needs and address environmental challenges.

One alternative increasingly being applied is Mina Padi Farming or fish-rice integration, where fish farming and rice farming are carried out simultaneously on the same land. (Sathoria, 2022; Christian et al., 2022). Integrated rice-fish farming, also known as Mina Padi, has long been traditionally practiced in many Asian countries, including Bangladesh, China, India, Japan, Malaysia, Myanmar, Philippines, Thailand, and Vietnam (Halwart & Gupta 2004; Hu et al., 2016). The concept has proven effective in increasing land productivity, improving farmers' income, and realizing food sovereignty (Pengseng, 2013). In addition, fish-rice integration also provides environmental benefits, such as natural control of weeds and plant pests, reduced water use, and improved soil quality by adding nutrients from fish waste (Lantarsih, 2016; Sumiarsih et al., 2019). However, in the specific context of lebak swamp land, challenges arise. Lebak swamps generally have soil characteristics that are low in oxygen content and pH (Kurniasih et al., 2019) and are often inundated with extreme water

in certain seasons (Saidi et al., 2019). Therefore, conventional agricultural practices are often ineffective in this region. In this situation, fish-rice integration becomes an attractive alternative that allows optimal utilization of lebak swamp land, potentially improving agricultural productivity and the welfare of local communities.

Thus, ethnoeconomic research that examines a plant's economic value or utilization in daily life by ethnicity based on local wisdom is important. According to Dirman et al. (2021), local wisdom is local wealth in a place closely related to traditions in the region and is hereditary. Examining the development of integrated rice-fish farming in lebak swamp land with an ethnoeconomic approach is important to fully understand the complex dynamics between cultural, economic, and environmental factors that influence the success of this system. Previous research has provided valuable insights into fish-rice integration's economic, social and environmental benefits (Nurhayati 2016; Lantarsih 2016; Akbar 2017; Lestari 2017; Fyka et al., 2023). However, there is still a lack of understanding of how the cultural factors and beliefs of village communities (Falah and Dorohungi, 2016; Fatimah et al., 2020; Syamsuri, 2024) influence the success of Mina Padi farming in wetland swamps.

Therefore, this research will complement the existing knowledge by investigating the ethnoeconomic aspects of developing fish-rice integration farming in the region. Thus, this research examines the interaction between cultural, economic, and environmental factors in developing integrated fish-rice farming in the lebak swamp. Using an ethnoeconomic approach, this research will explore the role of cultural norms, traditional practices, and social dynamics in adopting and succeeding the Mina Padi system in the region. In addition, the research also aims to assess the economic benefits of Mina Padi farming development in the swamp.

MATERIALS AND METHODS

This study was conducted from March 2023 to February 2024 in Epeesi Village, Basala Sub-district, South Konawe District, Southeast Sulawesi, Indonesia. This period was chosen to cover the rice planting and fish harvesting cycles according to the rainy (November-March) and dry (August-October) seasons. The method used was a mixed methods approach, which combines qualitative and quantitative analyses with an ethnoeconomic approach (Albuquerque et al., 2009; Dikaumaya & Wati, 2019; Haruna et al., 2022; Pandey & Tripathi, 2017). This approach was used to understand the economic value of rice and fish farming based on the local wisdom of the Bugis community.

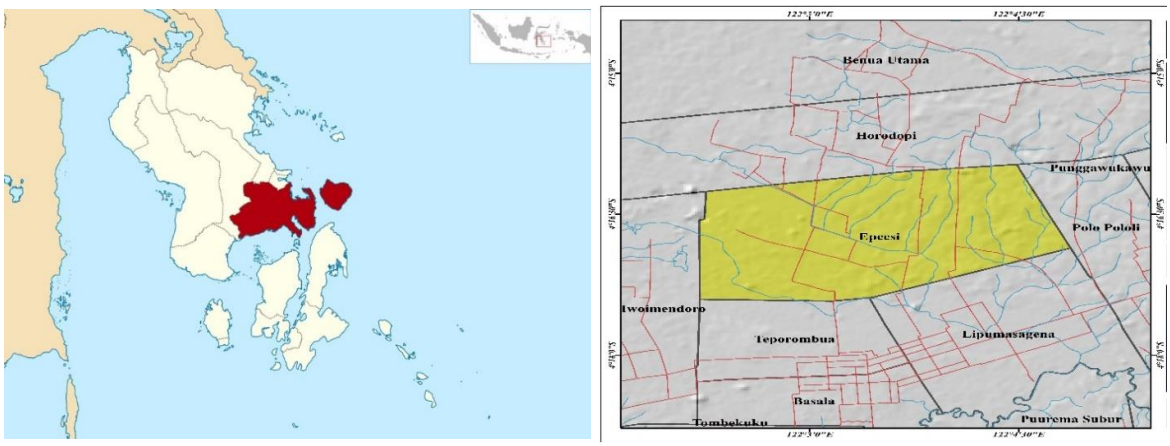

Figure 1. Research location

The study population included all Mina Padi farmers in the village. Seventy-five farmers were selected using the census method to ensure that all farmers involved in this farming enterprise were represented. The village head and three farmer group leaders were selected as key informants using a purposive sampling technique as they deeply understand the history, socioeconomics, and management practices of Mina Padi farming (Alburquerque et al., 2014).

Data were collected through direct observation to record land conditions and cultivation practices in the field. Semi-structured and in-depth interviews were conducted to obtain detailed information on farm management and economic value. Informants were selected using a snowball technique based on recommendations from residents who are experts in Mina Padi farming. Additional documentation was obtained from production records and official village reports.

Quantitative data were analyzed using descriptive statistics such as averages and percentages to measure farmers' production yields, income, and business costs. Meanwhile,

qualitative data was analyzed using content analysis methods to identify key themes such as traditional practices, local innovations, and socioeconomic values associated with Mina Padi cultivation (Newing, 2011). The results of these two data types were then integrated into descriptive narratives to provide a complete and in-depth picture of the economic and social benefits of Mina Padi farming practices in lebak swamplands.

RESULTS AND DISCUSSION

The ethnoeconomics of Mina Padi farming development on lebak swamp land studies the complex interactions between cultural, economic, and environmental factors in agricultural practices. This approach involves applying farmers' local and cultural knowledge in developing an integrated farming system where rice farming and fish farming are carried out in the same field. This ethnoeconomic study will examine how ethnic, cultural, and social factors influence the adoption, development, and success of Mina Padi systems in lebak swamplands. This includes understanding the cultural norms that influence farmers' decision-making, the social labor system in farming practices, and the role of rituals and traditions in the fish-rice farming cycle. In addition, an assessment will be conducted on the economic benefits of developing Mina Padi farming in wetlands.

Ethnoeconomics of Mina Rice Farming Development in wetland swamps

Mina Padi farming on wetlands in South Konawe District, Southeast Sulawesi Province, is only conducted in Basala Sub-district, precisely in Epeesi Village. Epeesi Village is a village with most Bugis people, and the main occupation is farming. Agricultural businesses in Epeesi Village are mostly plantation and paddy rice farming. The Bugis tribe that occupies this village is with the majority of the Bugis Bone tribe, and there are also Bugis Luwu, Wajo, Soppeng, Sidrap, Pinrang, Barru, Bulukumba, Sinjai, Maros, Pangkajene Islands, and there are also Makassar tribes. The Bugis tribe in Epeesi Village is spread across four hamlets: Hamlet I is dominated by the Bone Bugis tribe, Hamlet II is dominated by the Bone Bugis tribe, and the Makassar tribe, Hamlet III is dominated by the Bone Bugis tribe, Hamlet IV is dominated by the Soppeng Bugis tribe. The farming habits of the Bugis tribe, in general, are passed down from generation to generation from the ancestors, which is where the current Bugis tribe that occupies Epeesi Village also learns from the habits and experiences of the previous Bugis people, both starting from cultivating the land to the harvesting process. This happens because the characteristics of the Bugis tribe when moving from their original area to the destination area, will still maintain their farming methods (Arno and Adijaya, 2023).

Mina Padi farming in Epeesi Village has been conducted for 14 years (2009-2023). is one of the agricultural cultivations that is quite an opportunity in Epeesi Village as one of the areas with sufficient water in Basala Sub-district, which makes farmers begin to see and take this opportunity to be used as one of the livelihoods to support the needs of farmers. Most farmers, including most of the Bugis tribe, cultivate Mina Padi. However, especially in Epeesi Village, there is one Bugis tribe that primarily does not cultivate Mina Padi, namely the Bugis Soppeng tribe. The community with the Bugis Soppeng tribe is more focused on cultivating plantation agriculture such as cocoa and pepper, some of which have also begun to cultivate oil palm. The Bugis Soppeng tribe in Epeesi Village does not cultivate paddy rice or Mina Padi. One of the factors is that the area's location does not allow for Mina Padi cultivation. Mina Padi farming management on the lebak swamp land is carried out by farmers based on land conditions that are suitable for rice and freshwater fish cultivation. The availability of sufficient water is one of the drivers for farmers to conduct Mina Padi farming. Initially, farmers tried to grow several types of agricultural crops on the land but were never maximally successful. So, based on their farming experience in their home areas and the crop trials conducted, farmers in the three (3) hamlets agreed to plant rice on the swamp land and cultivate freshwater fish better. Mina Padi farming on the lebak swamp land in the research location is still being implemented.

The local wisdom beliefs of the Bugis tribe of the farming village community that is still used during the cultivation of the Mina Padi lebak swamp are as follows:

Rice and Fish Farming in Lebak Swampland

a) Land Preparation

The implementation of Mina Padi farming in the research location differs in the land used. The land used by farmers is lebak swamp land. The characteristic of swamp land is that water availability is sometimes difficult to control; during the rainy season, water availability in the land becomes excessive, and during the dry season, water availability in the land becomes reduced. Excessive waterlogging on the land will disrupt the process of rice and fish cultivation. In addition, the existing

irrigation system at the site is lebak. It only relies on rainwater once a year. This condition causes farmers to use the right technology to overcome these problems.

Ma'jama galung (land management) is carried out according to the land conditions for Mina Padi cultivation. Farmers take *care* of a place to manage water on the land. The primary function of Caren in the context of integrated rice and fish farming is as a drainage system that facilitates optimal water distribution for rice plants and fish (Naufal and Chofyan, 2022; Kristiana, 2023). The size of the caren made by farmers is between 100 - 200 cm wide and 80 - 200 cm deep. At the same time, the size of rice field bunds made by farmers is at least 50 cm wide and 100 cm high.

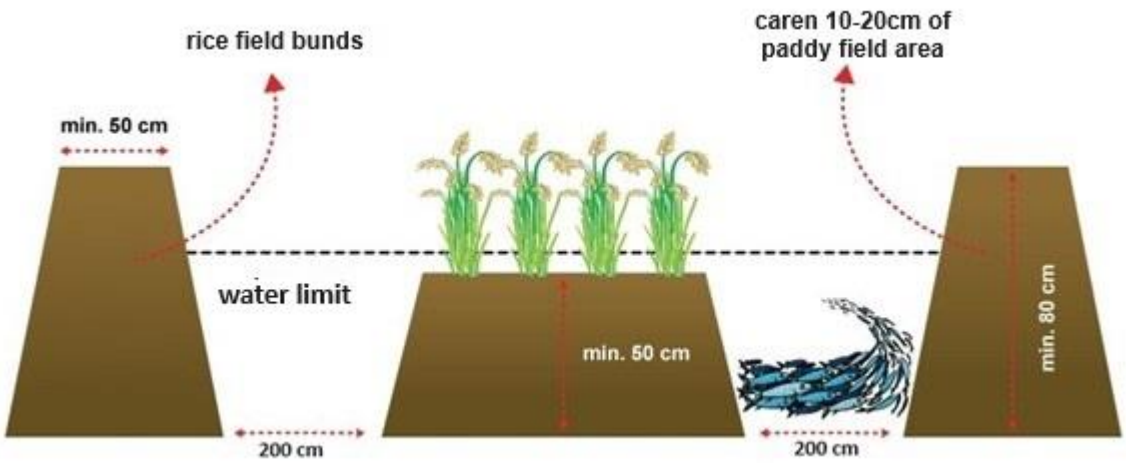

Figure 2. Caren in mina padi rice field in Lebak Swamps

The landform used is the shape of a traveling pond. In this form, the farmland area with rice plants is placed in the center, while the fish pond is placed around it (Cahyanti et al., 2014; Kurnianingtyas, 2023). With this design, the fish pond serves as a source of water and nutrients for the farmland.

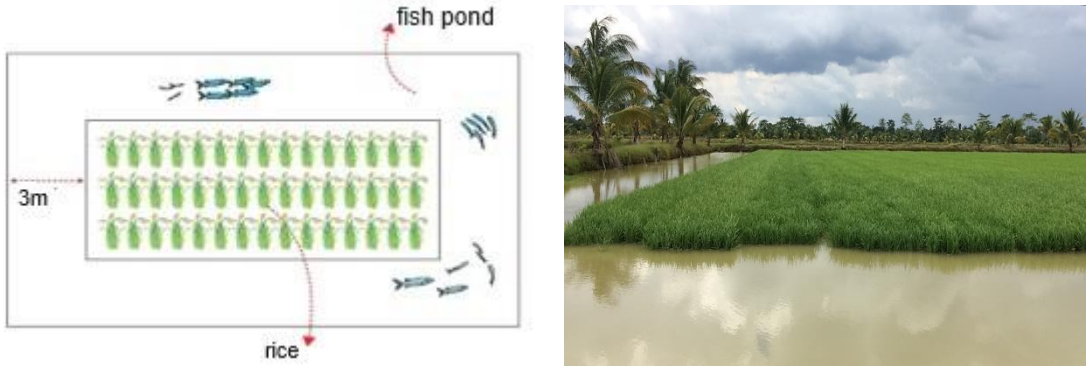

Figure 3. The shape of the perimeter pond mina padi farming on Lebak Swampland

b) When Sowing Rice Seeds.

Farmers still apply *Appano' bine'* (sowing rice seeds). This activity aims to prepare quality seeds for optimal growth of rice plants in the main agricultural land and increase the productivity and sustainability of farming carried out by farmers. Before starting sowing, farmers first look at good days *(mita esso)*, based on the moon's rotation, and usually start on the day of birth or on days considered contained (sound).

c) Planting Rice

At the time of planting rice, before starting to plant, first selecting a good day *(mita esso)* based on belief and starting the process *(Mappammula)* is coupled with certain rituals such as Shalawat Nabi and Dhikr by people who are considered able to carry out the procession, usually carried out at dawn or in the afternoon carried out by one person without anyone disturbing, after the

process of starting *(Mappammula)* is complete then the next can be done planting rice together *(Mattaneng Ase)*.

d) Treatment of Rice and Prevention of Pests and Diseases

In the process of treatment and prevention of pests and diseases, people usually also use spiritual methods, such as water or materials from nature, such as coconut leaves.

e) Stocking Fish in the Pond

Fish stocking is done after 1 - 2 months of the age of the rice plants. The average number of fish fry stocked in the field is 1,000 fish/ha. Before the fish are stocked into the Mina Padi field, farmers usually introduce the fish to the pond water conditions used. This process is usually known as acclimatization (Augusta, 2012; Padusung et al., 2012). The local wisdom of Bugis farmers in the research location is called lowering the fish into the pond (*Mappano bale*). This activity aims to reduce stress and facilitate the transition of fry from rearing conditions to a broader pond environment. This is because fish fry needs time to adapt to new conditions before being released into the pond. The usual method farmers use is a container, such as making a mosquito net plot with a size that is not too large, about 1 m x 0.5 m. The container is filled with fish seeds. The container is filled with fish seeds and then placed on the water's surface for a certain period, usually 15-30 minutes.

Figure 4. Fish acclimatisation containers in the rice mina farming field of Lebak Swamp

Farmers carry out feeding (Mabbobo bale) by providing additional feed in the form of bran, with a duration of time usually two (2) times a week. However, generally, farmers do not feed the fish because they rely on the mutually beneficial symbiosis that results from Mina Padi farming practices (rice-fish integration on the same land). Farmers feel that by cultivating at the same time as rice, there are already small animals and plankton in the pond to fulfill the nutrition of aquatic fish.

f) Harvesting *(Massangki)*

Before the harvesting process, is preceded by starting again for harvesting, known as *(Mappammula)*. This is done by a particular ritual procession, such as Shalawat Prophet and Dhikr, carried out at dawn or in the afternoon. After that, harvesting is carried out after the process is complete until it becomes rice. Then there is thanksgiving in each farmer's house to eat new rice, such as cooking rice, and on top of it, there is an egg that recites Dhikr, etc.,

Harvesting of rice and fish on the lebak swamp land in Mina Padi farming is done in different stages. This happens because rice and fish cultivation have different growth cycles. Rice has a shorter growing period compared to fish. In lebak swamp conditions, rice can usually be harvested within 3-5 months after planting, while fish take longer to reach the desired harvest size. During massangki (rice cutting), which used to be done using a kandao (sickle), heavy equipment such as rice cutters could not enter because the land was still waterlogged. The container for storing the cut rice is usually a boat made of tarpaulin, which Bugis farmers commonly refer to in the research location as *Lopi Terpal*. *Lopi Terpal* is used because the land is waterlogged.

Meanwhile, during the fish harvest, farmers first drain the ponds to harvest the fish *(Mappametti)*. This draining usually uses a water suction device rented by the farmer. After the water is drained, the farmers net the fish *(Majjala bale)* using trawls or bubu. This activity is usually carried out jointly or *gotong royong*.

g) Post-Harvest

After all residents have harvested, a few months later, when planting will be carried out again, there is a massive thanksgiving held by the Epeesi Village community, namely *Mallemmang* (Making Bamboo Rice), which is usually crowded and very later in the community. This activity is carried out

as a form of gratitude to Allah SWT, who has provided sustenance through rice and fish harvests that benefit farming families and the community.

Figure 5. Harvesting rice paddy and fish harvesting in mina rice field in Lebak Swamp

Benefits of Rice Mina Farming in the form of Lebak Swamp Land Development

Mina Padi farming is an integrated agricultural concept that combines fish farming and rice farming on the same land. This approach can provide benefits to farmers and families in the form of income diversification and sustainably strengthening food security.

Income diversification in the context of Mina Padi farming is an important strategy for reducing the economic risks faced by farmers and improving their economic welfare. This concept refers to the ability of farmers to earn income from various sources other than rice harvests, primarily through the sale of fish raised in the rice fields and fishing tours. Mina Padi's farming management at the research location is carried out on lebak swamp land. The primary constraint for developing lebak swamp land is inundation or drought, which cannot be predicted, depending on the local river's hydro topography, rainfall, and water level. The only source of water for this land is rainfall. Therefore, production can only be done once a year. This has an impact on the income received by farmers.

This income diversification has several significant implications, namely (1) income diversification helps reduce the financial risks farmers face. By having multiple sources of income, farmers become less vulnerable to fluctuations in rice prices and production that may occur due to climatic conditions or other factors. For example, when rice prices fall, or rice yields decline, income from fish sales can help maintain the stability of the farmer's family income. (2) income diversification also opens up new opportunities for farmers to optimize land use. Apart from the paddy fields used for rice cultivation, a portion of the land can be allocated to construct fish ponds. In this way, farmers can utilize land that may not be suitable for rice farming to generate additional sources of income from fish. (3) income diversification can also improve farmers' overall economic welfare and increase their purchasing power in the local economy. Additional income from fish sales can be used to fulfill daily needs, pay for children's education, or invest in infrastructure improvements and agricultural technology.

Several studies have shown the benefits of income diversification in Mina Padi farming. For example, research by Sularno & Jauhari, 2014 conducted in Soropadan village, Pringsurat sub-district, Temanggung district, also gave similar results. With the application of the minapadi system, farmers get an income of Rp 27,469,650, -, while if the monoculture system is applied, the income received is only Rp 20,304,400, -. Likewise, research by Sukri & Suwardi, 2016 stated that the total income of minapadi farmers from the sale of grain and fish was Rp 2,960,000, or an increase of 32% compared to the monoculture system. Another study showing the advantages of minapadi was conducted by Rahman, Haque, and Sarma, 2012. Minapadi farmers were able to obtain profits 3

times higher than monoculture farmers. This shows that income diversification through fish-paddy integration can effectively improve farmers' economic welfare. It can be concluded that income diversification in Mina Padi farming is an important strategy for improving farmers' economic resilience, optimizing land use, and improving overall economic welfare (Fyka et al., 2024).

Food self-sufficiency in the context of Mina Padi farming, or fish-fish integration, refers to the ability of a region or community to fulfill their food needs independently without having to rely on imports from outside.

Table 1. Benefits of mina padi farming on rice Lebak Swamp Land

No.	Benefit Type	Amount (kg/ha)	Consumption (Kg/ha)	Sell (Kg/ha)
1	Rice Production Yield	1.324	860,60	463,40
2	Fish Production Yield	232	46,40	185,60
3	Results of Fishing Tourism	3 people/week with income @Rp50,000/person		

Based on Table 2, it is known that the treatment of Mina Padi farmers towards their production results is different. Paddy rice production is mainly used for family consumption at 65% or 860.60 kg/ha. While those sold are only 35% of the production or 463.40 kg/ha). More fish are used for sale, which accounts for 80% of the production or 185.60 kg/ha. Meanwhile, only 20% of the production was consumed, or 46.40 kg/ha. From the sale of Mina Padi production and the results of fishing tours, on average, farmers allocate it in several parts, namely 15% for savings, 45% for food needs, 20% for children's school needs, 5% for social needs and the rest for further farming needs. Therefore, Mina Padi farming, which farmers carry out, can provide food independence for family needs such as rice and fish.

The concept has several important implications related to economic sustainability and food security, namely (1) fish-rice integration allows the production of two primary food sources, rice from rice farming and fish from fish ponds, on the same land. This increases food availability at the local and regional levels, as people can access two main types of food from the same source. Thus, farmers and local communities become more independent in fulfilling their food needs without relying on imports from outside. (2) Food self-sufficiency is also related to diversifying food sources and increasing food system sustainability. By having access to two different types of food, namely rice and fish, people can choose the type of food they consume. This helps create a more balanced and quality diet, which can improve people's overall health and well-being.

Several studies have highlighted the contribution of fish-rice integration to food self-sufficiency. For example, research by Ahmadian et al. (2021), Sumiarsih et al. (2019), Lestari & Bambang (2017), and Ahmed et al. (2022) that increased productivity of Mina Padi farming has contributed to community food security. In addition, the results of these studies found that farmers involved in Mina Padi farming have better access to food, especially rice and fish, than farmers who only farm rice. This suggests that fish-fish integration can be an effective strategy for improving food self-sufficiency at the local level. It can be concluded that food self-sufficiency is one of the main benefits of fish-fish integration, which helps improve food security and sustainability of food systems at local and regional levels. Farmers and local communities become more independent in fulfilling their food needs by producing two primary food sources simultaneously.

CONCLUSION

The research revealed that the Mina Padi integration system in the lebak swamplands, which still honors the local wisdom of the Bugis tribe, has significant economic impacts on farmers. The practice, which includes land management and cultivation of rice and fish, helps farmers increase income diversification, mainly through fish sales, which reduces financial risk and improves their welfare. In addition, the system also supports food self-sufficiency for local communities by producing rice and fish from the same land, contributing to food security and public health. This study shows how local wisdom in agricultural practices can provide sustainable economic benefits. For future research, it would be beneficial to explore how modern technology can be integrated into the Mina Padi system to increase productivity and efficiency and to look at the potential of implementing this system in other areas with similar conditions.

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