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THE EXISTING ANALYSIS OF RICE-FISH INTEGRATION FARMING ON LEBAK SWAMP LAND IN TERMS OF SOCIAL ECONOMIC AND INSTITUTIONAL DIMENSIONS

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ABSTRACT

Rice-fish integration farming is an integrated farming system that combines rice and fish cultivation on the same land, and has developed adaptively in the wetlands of Epeesi Village, South Konawe District. This study aims to identify and analyze the existing social, economic, and institutional conditions in the practice of integrated rice-fish farming as a basis for sustainability assessment. The research employed a combination of descriptive qualitative and quantitative approaches, with primary data collected through structured interviews with 75 rice-fish integration farmers, supplemented by secondary data and field documentation. The results showed that socially, this system is supported by ethnic-based community cohesion, family participation, and local wisdom, which remain sustainable and serve as an adaptive force. From an economic perspective, rice-fish integration can improve household food security and farmers' income through commodity diversification and ecotourism services. However, access to capital and formal markets is still limited. Meanwhile, the institutional aspect reveals that farmers' institutions have been established, but their functions are not yet optimal, with minimal support from extension services and partnerships. These findings confirm that the sustainability of integrated rice-fish farming is highly dependent on the integration of social values, household economic resilience, and the strengthening of local institutions. Therefore, agricultural policies that favor local communities and are based on multi-stakeholder partnerships need to be mainstreamed to encourage the replication of this system as a sustainable agricultural model in marginal ecosystems.

Keywords: agricultural sustainability; lebak swamp; rice-fish integration.

INTRODUCTION

Rapid population growth and conversion of agricultural land to non-agricultural uses have posed serious challenges in meeting national food needs (Nurpita et al., 2018; Putri et al., 2024; Usman et al., 2025). In this context, swampy wetlands scattered throughout various parts of Indonesia, including the South Konawe District of Southeast Sulawesi Province, have great potential to be developed as alternative agricultural land. Lebak swamp land is an area that is periodically inundated with water, yet it has high soil fertility, making it suitable for cultivating food crops such as rice (Minsyah, 2023; Wahyu & Suparwoto, 2017).

One of the innovations in utilizing the Lebak swamp land is the rice-fish farming system, which integrates rice and fish cultivation on the same land. This system not only increases land-use efficiency but also provides income diversification for farmers and supports the sustainability of agricultural ecosystems (Freed et al., 2020; Nisa et al., 2023; Saputra et al., 2022). Various studies have shown that the implementation of rice-fish systems can increase land productivity, reduce pesticide use, and increase farmers' income (Berg & Tam, 2018; Freed et al., 2020; Fyka, Limi, et al., 2023).

However, although the potential of the rice-fish integration system has been widely discussed in various studies, there are still limited studies that specifically analyze the existing conditions of rice-fish integration farming in wetland swamps, especially in the South Konawe District. Most of the previous studies focused more on the technical aspects of cultivation, such as planting methods, input use efficiency, or yield improvement, as well as on general economic analysis focusing on productivity and financial benefits of the rice-fish integration system (Ahmed & Garnett, 2011; Dwiyana & Mendoza, 2008; Jyoti et al., 2020). While such approaches are important for identifying agronomic potential and economic efficiency, they often overlook the social and institutional dimensions that significantly impact the success and sustainability of these systems. The long-term success of integrated rice-fish farming systems is highly dependent on social dynamics, local institutional structures, farmers' capacity to adapt to innovations, and targeted policy and extension support (Triyanti et al., 2021).

Therefore, it is essential to conduct research that explicitly analyzes the existing conditions of the rice-fish integration system at the field level to understand the factors that support and hinder its implementation entirely. This research focused on the Lebak swamp land in South Konawe District, which has the potential for rice-fish integration but has not been comprehensively studied. This region also has unique socio-economic and ecological characteristics that are important variables in the successful adoption of integrated farming systems.

The existing conditions analyzed encompass social aspects, including community participation, the functioning of farmer groups, and the role of local wisdom; economic aspects, such as cost structure, farmer income, and market access; and institutional aspects, including extension support, government programs, and access to financing institutions. Thus, the purpose of this research is to thoroughly analyze the existing conditions of integrated rice-fish farming in the South Konawe Regency wetland, encompassing social, economic, and institutional aspects, in order to produce strategic recommendations that are contextual and support the development of a sustainable rice-fish integration system based on local potential.

MATERIALS AND METHODS

This study used a descriptive quantitative approach to systematically describe the existing conditions of Rice-Fish Integration farming based on empirical data in the field. The research location was in Epeesi Village, Basala Sub-district, South Konawe District, Southeast Sulawesi Province, which was purposively selected because it is one of the areas with active and growing practices of Rice-Fish Integration on wetland swamps (Fyka, Salam, et al., 2023).

The population in this study consisted of all farmers who operate Rice-Fish Integration farms in Epeesi Village. The determination of respondents was carried out using a total sampling technique, as the population was relatively small and could be fully reached (Asrulla et al., 2023). A total of 75 farmers became respondents in this study.

Primary data were collected through structured interviews using questionnaires and direct observation of farming activities in the field. The questionnaire instrument was developed based on sustainability indicators relevant to integrated farming systems, encompassing social, economic, and institutional aspects. Secondary data were obtained from official village government documents, agricultural extension reports, and results of previous studies relevant to the context of Rice-Fish Integration. Data collection was conducted through field visits and the completion of questionnaires by trained enumerators. To ensure data validity, a cross-check (data triangulation) was conducted between the results of questionnaires, observations, and secondary data (Patton, 1999).

The data analysis technique employed is quantitative descriptive analysis, with data presented in the form of frequency distributions, percentage tabulations, and score categorizations for each indicator (Sugiyono, 2013). The results of the analysis were used to objectively and systematically interpret the existing conditions of the Rice-Fish Integration farm, which were then presented in the form of scientific narratives and supporting tables.

RESULTS AND DISCUSSION

Existing Social Conditions of Rice-Fish Integration Farming

The study of the social conditions of farming communities is a crucial basis for assessing the sustainability of farming systems, especially in areas with unique ecological and cultural characteristics, such as the Lebak swamplands. The social dimension in this context not only reflects the dynamics of relationships between individuals or groups, but also illustrates how local values, norms, and practices shape production patterns, labor distribution, and resource management in

agricultural systems. The Rice-Fish Integration System in South Konawe District is a typical example of an agricultural practice that emerges from the integration of ecological adaptation and community social structure.

Therefore, the mapping of existing social conditions in this study focused on four main aspects that are interrelated and form the social foundation of sustainability, namely the social structure of farmers, the preservation of local wisdom, access to information and counseling, and the level of environmental awareness. These four aspects are analyzed holistically to illustrate the extent to which the community's social capital supports the sustainability of the Rice-Fish Integration system, as well as the challenges that still need to be addressed through empowerment-based approaches and cross-sector collaboration.

1. Social Structure

The social structure of Rice-Fish Integration farmers in Basala sub-district reflects a strong and cohesive agrarian community configuration, characterized by involvement across all age groups and educational levels. The majority of farmers fall within the middle-aged category (36-50 years), accounting for 65.33%, while the young farmer group comprises only 6.67%. The following table shows the social structure of farmers in the rice-fish integration system.

Table 1. Summary of the social structure of rice-fish integration farmers

Indicator	Category	Number (%)
Age	36-50 years old (middle-aged)	65,33
Education	Elementary-middle School	81,30
Main Employment Status	Oil palm and patchouli (Rice-Fish byproduct integration)	100,00
Family Participation	1-3 family members involved	77,33

The dominance of farmers in the productive age group, especially those aged 36-50 years, on the age indicator, indicates that the agricultural sector is still supported by a generation that is biologically and socially adaptable to innovations and technologies. This age group tends to have sufficient field experience, but is also still open to renewal of farming methods and approaches. White (2015) emphasizes that the productive age plays a strategic role in agricultural technology transition due to the balance between physical capacity, conventional knowledge, and openness to training. This is reinforced by Rizzo et al. (2024), who demonstrate that farmer age is positively correlated with readiness to adopt innovations, provided adequate institutional support and training are available.

In terms of education, 81.3% of farmers have only received basic education (SD-SMP), which limits their understanding of cultivation technology and access to the latest information (R. M. Kumar et al., 2023). This condition also affects farmers' independence and adaptability to climate and market changes (Olabanji & Chitakira, 2025).

The economic structure of farmer families also shows the characteristics of multiple occupations. Although all respondents (100%) were active in integrated rice-fish farming, 73.33% considered oil palm as their primary livelihood, and 30.67% considered patchouli as their main source of income. This suggests that Rice-Fish Integration is viewed as a secondary business, which may have implications for the limited time dedication and technology investment (Rahman et al., 2021).

In terms of family participation, 77.33% of farmers are assisted by 1-3 family members in agricultural activities, reflecting the potential for strengthening household capacity in sustainable agricultural systems (Contzen & Forney, 2017).

2. Local Wisdom

Local wisdom in integrated rice-fish farming remains firmly in place, even amid modernization. Six primary forms of local wisdom are still applied by farmers, including: *appano' bine'* (sowing seeds), *mita esso* (determining good days), *mappammula* (initial rituals), *mattaneng ase* (joint planting), *massangki* (joint harvest and thanksgiving), and *mallemmang* (tradition of cooking bamboo rice as a form of gratitude). These practices are not merely symbolic but have a tangible impact on the sustainability of agriculture, both ecologically, socially, and spiritually.

For example, *mita esso* is believed by farmers to reduce the risk of pest attacks and crop failure. A farmer stated:

> "If we plant on a day that does not align with the lunar calendar, pests usually come sooner, and the plants become weak. We believe it is not just about tradition, but it has been passed down through generations." (Interview, Farmer 03, Epeesi Village, 2024)

Table 2. Forms of local wisdom in rice-fish integration cultivation

Types of Local Wisdom	Meaning and Practice
Appano' bine'	Sowing rice seeds by paying attention to good days (mita esso)
Mita esso	Selection of auspicious days based on the rotation of the moon
Mappammula	The initial ritual before cultivation, usually shalawat and dhikr
Mattaneng Ase	Planting rice in cooperation
Massangki	Harvesting that begins with rituals and thanksgiving for the new rice
Mallemmang	Making bamboo rice as a form of gratitude for the harvest

The *mappammula* ritual is also seen as a moment of spiritual alignment with nature. Farmers associate this practice with mental preparedness and respect for the land, which ultimately encourages caution in land cultivation and planting. Meanwhile, collective practices such as *mattaneng ase* and *massangki* strengthen social solidarity and labor cooperation, thereby reducing production costs and facilitating knowledge exchange among farmers. This collaborative work pattern facilitates the formation of local networks that promote the sustainability of cultivation techniques from one generation to the next.

This wisdom shows that the production system is not only yield-oriented, but also instills the values of spirituality, togetherness, and harmony with nature. These values are important assets in sustainable agricultural development, as they motivate farmers to maintain ecological and social balance (Nepal, 2023; Sharma, 2017).

3. Access to Information and Counseling

This aspect is the biggest challenge in the social system of integrated rice-fish farming. Although extension plays a crucial role in improving farmers' capacity, the data shows that the frequency of extension services is very low due to the limited number of extension workers in the area. There is only one agricultural extension officer, and no fisheries extension officer is active in the area.

This results in limited transfer of the latest technology and knowledge, which in turn reduces farmers' adaptive capacity to climate dynamics, plant diseases, and market fluctuations. Nonetheless, farmers show independent initiative by utilizing social media and the internet to search for cultivation information (Ramavhale et al., 2024). This indicates the need to build a more structured and accessible agricultural information system

Another unique feature that emerged was the ability of farmers to fill the void of formal extension services with alternative sources of information. In the absence of extension workers, farmers are not passive. They utilize social media independently to find solutions for fish and rice cultivation, as well as maintenance techniques. This phenomenon reflects a transformation in farmers' learning patterns, from previously relying heavily on external actors, such as agricultural extension officers, to becoming more independent through community-based approaches and the utilization of simple technologies, including mobile phones and social media (R. Kumar, 2023). This adaptation is essential in rural areas that face limited physical infrastructure and a low ratio of extension workers to the number of farmers. Digital technologies, including messaging applications and short videos, are now becoming a new means of disseminating agricultural information horizontally between farmers and vertically from institutions to farmers. This opens up opportunities to integrate locally-based agricultural information systems with more inclusive and contextualized participatory learning models (Singh et al., 2023).

4. Environmental Awareness

Farmers' environmental awareness is reflected in the sustainable agricultural practices they have implemented for generations. The Rice-Fish Integration System itself is a form of integrative agrosystem that emphasizes resource efficiency and ecosystem balance. The use of ponds in rice fields not only increases productivity through diversification of products (rice and fish), but also reduces the excessive use of pesticides and chemical fertilizers, because fish help control pests (Dewi, 2023; Upe et al., 2023; Yassi et al., 2023).

In addition, cooperation in the form of gotong royong between farmers—especially during land cultivation and harvesting—demonstrates social solidarity, which is an important form of social capital in land conservation. Social harmony is also reflected in the absence of conflict between farmers, which is reinforced by ethnic homogeneity (the majority are of Bugis origin) and common economic goals.

Table 4. Summary of environmental awareness of rice-fish integration farmers

Indicator	Description of Findings
Environmentally friendly cultivation practices	Integrated rice-fish system reduces pesticide demand.
Conflict between farmers	None, homogeneous and cohesive community
Cooperation	Still strong, especially during tillage and harvest
Tradition-based conservation	Reinforced by local values in farming practices

Meanwhile, the social harmony created among farmers is also a foundation of sustainability that cannot be ignored. The absence of conflict during the Rice-Fish Integration practice is closely related to the homogeneous cultural background, where the majority of farmers come from the Bugis tribe. The social relations formed among farmers are not merely working relationships, but reflect a kinship network strengthened by social norms and a sense of community. The practice of cooperation, which is still maintained in land cultivation and harvesting activities, not only demonstrates social solidarity but also contributes directly to the sustainability of agricultural resource management. In a culturally homogeneous community—where most farmers are of Bugis ethnicity—there is a strong social norm emphasizing the importance of preserving the land as a shared heritage. This culture of collective work is not merely carried out because of tradition, but as an efficient strategy to maintain the sustainability of farming. One farmer said:

> "We are used to working together in the fields. If we all work alone, the costs are high and it is tiring. However, when we work together, not only do we save money, but we also remind each other to use pesticides and excessive fertilizers judiciously. That will damage the soil." (Interview, Farmer 07, Epeesi Village, 2024)

This quote demonstrates that local cultural values are not merely symbolic but are deeply internalized in daily practices with significant ecological implications. The control of chemical input use and collective land management is part of unwritten norms preserved through social interactions at the community level.

The study by Zain et al. (2022) demonstrates that social capital, encompassing networks, trust, and shared values within the community, plays a crucial role in facilitating cooperation and resource sharing among farmers. This social capital enables farmers to access resources such as knowledge, financial assistance, and market information that may be difficult to obtain individually. Furthermore, research by Lai et al. (2025) emphasized that subjective conservation norms emerged as a key pathway through which farmers' social capital influences the use of sustainable agricultural practices, such as no-till farming. This suggests that social norms and trust built within farming communities can drive the adoption of environmentally friendly farming practices.

Existing Conditions of Rice-Fish Integration Farming Economy

The economic aspect is one of the key indicators in assessing the sustainability of farming systems, especially in the context of smallholders in marginal areas, such as the Lebak swamp land. Agricultural systems are not only required to increase productivity, but must also ensure income sustainability, household food security, and the efficiency of sustainable resource utilization (Altieri & Nicholls, 2017; Pretty et al., 2011). In the context of integrated rice-fish farming, the economic approach not only reflects the commercialization of agricultural products but also encompasses survival strategies, business diversification, and household financial management patterns.

Based on this, the analysis of existing economic conditions in this study focuses on four main aspects: the ability to provide food, income diversification, access to capital and credit, and market access. These four aspects were studied to illustrate the extent to which integrated rice-fish farming can fulfill farmers' economic needs independently and resiliently, and to identify the potential for local economic development based on available resources.

1. Ability to provide food

One important aspect of the economic sustainability of farmer households is the ability of farms to fulfill family food needs. Based on primary data from 2023, Rice-Fish Integration farming has been proven to have a high capacity for providing two main types of food simultaneously, namely rice and freshwater fish. Rice production reached 1,176 kg/ha/growing season, while fish production was around 232 kg/ha/growing season. Of this amount, about 50% of the rice harvest (588 kg) and 10% of the fish harvest (23.2 kg) are consumed directly by farming families.

Table 5. The ability of rice-fish integration farms to provide food

Production Type	Total Production (kg/ha/MT)	Family Consumption (kg/ha/MT)	Consumption Proportion (%)	Description
Rice	1.176	588,0	50	Used for household consumption, the rest is sold
Freshwater Fish	232	23,2	10	Source of household protein, mostly sold

This condition demonstrates that the Rice-Fish Integration system is not only market-oriented but also plays a crucial role in enhancing household food security. This ability reflects the efficiency of the dual production system in answering calorie and protein needs simultaneously (Sumarsih et al., 2020). In the context of sustainable agricultural development, the Rice-Fish Integration system has strategic value as an agroecological solution that is adaptive to the challenges of food inflation, climate change, and limited food access in remote areas (Yassi et al., 2023). This aligns with the food sovereignty approach, which emphasizes local control over food systems, where farmers are not only producers for the market but also the primary actors in ensuring the sustainability of household consumption through integrated production system management (Holt-Giménez & Altieri, 2013).

2. Income Diversification

Income diversification is a key element in farmers' adaptive strategies to economic and environmental risks. The findings show that all respondents (100%) derive their income from two primary sources: rice harvest and fish farming. As many as 64% of farmers also run fishing tours in the cultivation area as an additional form of diversification based on environmental services.

Table 6. Diversification of income sources of rice-fish integration farmers

Income Type	Description	Percentage of Farmers (%)
Rice Sales	The main results of rice cultivation	100
Freshwater Fish Sales	Results of fish farming in the Rice-Fish Integration system	100
Fishing Tourism	Side business based on environmental services (ecotourism)	64

Through this approach, farmers not only rely on commodity yields but also create economic value from the potential of ecotourism. This indicates that the Rice-Fish Integration system is characterized by multifunctionality, which enables the combination of food production, income generation, and ecosystem services within a single farming unit. From a rural economic development perspective, this suggests that diversification in farming systems can enhance income stability and reduce farmers' vulnerability to market fluctuations or single-crop failure. The Rice-Fish Integration Model embodies the principle of resilient livelihood, a livelihood system characterized by high flexibility and adaptive capacity in the face of economic uncertainty (Yassi et al., 2023). This approach is also in line with the agroecological framework that emphasizes the importance of local control, production diversity, and sustainable food systems (Holt-Giménez & Altieri, 2013).

Overall, the Mina Padi economy represents an adaptive, resilient, and relevant agroeconomic model for smallholder communities in the context of climate change, resource constraints, and the need for sovereign local food systems (Freed et al., 2020; Shalihah & Rusdiyana, 2022). This finding confirms that economic sustainability in agriculture does not necessarily stem from high-tech intensification, but can also grow from the integration of local values, social innovation, and the wise utilization of land's multifunctionality (Sumarsih et al., 2020; Yassi et al., 2023).

3. Access to Capital and Credit

The condition of farmers' access to capital shows a relatively high level of independence. Based on the interview results, most farmers use their capital to finance the Rice-Fish Integration farm. Although they received fish seed and feed assistance from the Fisheries Service in 2019 and are planning to receive it again in 2024, the support is irregular. Dependence on subsidies and loans is very low.

Most farmers stated that they have never accessed formal financial institutions due to the requirement constraints and concerns about the risk of default. One farmer said:

"If you borrow from a bank, you need collateral, you have to propose, and if you are late in paying, you can be fined. So it is better to use your own money, even if it is limited." (Interview, Farmer 04, Epeesi Village, 2024)

Table 7. Farmers' capital sources and credit access

Capital Source	Percentage of Farmers (%)	Description
Personal Capital	Majority	Used as the primary source of business financing
Government Assistance (sporadic)	Limited (year 2019, plan 2024)	Not routine, incidental
Formal Credit	Very low	Administrative constraints and fear of default
Non-formal Loan	Available, but limited	Performed only in emergency conditions from family/neighbors

Farmers prefer not to go into debt and rely on capital from previous business results or family assistance. This reflects the principle of prudence and microeconomic rationality in making financial decisions. On the other hand, the lack of access to formal credit can also limit the potential for business development, particularly in terms of modernizing tools and technology, as well as expanding the scale of production. This phenomenon aligns with the findings of Jimi et al. (2019), who stated that limited access to credit leads to stagnation in technology adoption and technical efficiency in farming. Administrative barriers and a lack of collateralizable assets are the main factors that prevent smallholders from accessing formal sources of capital, as described by Kamugisha et al. (2025). These limitations are more pronounced for farmers with limited assets and low levels of financial literacy. Therefore, it is necessary to develop community-based and low-interest microfinance schemes as a solution to support the expansion of Rice-Fish Integration practices without creating risk burdens for smallholder farmers.

4. Access to Market

In terms of market access, farmers' conditions are quite favorable as they do not experience significant difficulties in selling their produce, both rice and fish. Direct relationships between farmers and intermediaries have been established informally and sustainably, allowing farmers to sell their crops directly without going through a lengthy distribution process. Some farmers also have direct buyers from neighbors or local consumers who visit the location during harvest time or on weekends. One farmer explained:

"Usually, after the harvest, we immediately contact our regular collectors. They come to pick up the produce, and although the price is not very high, we do not have to transport it to the market, so we get paid quickly." (Interview, Farmer 05, Epeesi Village, 2024)

Another farmer added that this system allows them to focus on production without having to be too involved in the distribution process:

"We do not sell to large markets, but to regular customers who come to our homes. This saves us time, as we do not need to rent a car or transport goods over long distances." (Interview, Farmer 02, Epeesi Village, 2024)

This direct marketing system minimizes distribution costs, accelerates cash flow, and provides farmers with flexibility in timing their sales. Although not facilitated through cooperatives, this trust-based economic interaction offers the advantage of efficiency, but also carries the potential for dependence on intermediaries. Going forward, strengthening market institutions through the establishment of cooperatives or farmer networks is needed to expand market access and improve farmers' bargaining position in the agribusiness value chain.

In addition to direct sales, some farmers utilize fish ponds as simple local tourist attractions, where residents can fish directly with a pay-on-site system. This serves as an additional source of income, strengthening farmers' household economies. One farmer explained:

"We sometimes open this pond to outsiders who want to fish. They pay per kilo. It is not much, but it is enough to buy feed or kitchen supplies." (Interview, Farmer 08, Epeesi Village, 2024)

Another interesting point is that there are ecotourism-based market opportunities through fishing tourism activities carried out throughout the year by some farmers. This demonstrates that the Rice-Fish Integration system not only produces food commodities but also opens up markets for environmental and recreation-based services, thereby indirectly increasing the economic value of land and expanding market options for farmers.

Interesting findings from the economic aspects of the Rice-Fish Integration farming system in Lebak swamp land show that this practice not only relies on commodity productivity but also integrates dimensions of food security, multiple incomes, and financial independence within one adaptive agricultural ecosystem. The prominent uniqueness lies in the system's ability to provide two household food sources simultaneously—rice and animal protein—directly and sustainably. With half of the rice harvest and some of the fish farming consumed by themselves, farmers not only act as market producers, but also as guardians of their family's food security. This model illustrates the transformation of land functions from mere production to the independent fulfillment of basic needs, guided by the principles of *food sovereignty* in sustainable agriculture (Freed et al., 2020; Sumarsih et al., 2020; Yassi et al., 2023).

Overall, the Rice-Fish Integration economy represents an adaptive, resilient, and relevant agroeconomic model for smallholder communities in the context of climate change, limited resources, and the need for a sovereign local food system. The findings confirm that economic sustainability in agriculture does not always stem from high-tech intensification, but can also grow from the integration of local values, social innovation, and the wise utilization of land's multifunctionality (Berg et al., 2023; Lu, 2024).

Existing Conditions of Rice-Fish Integration Farming Institutions

Farming systems are not only determined by technical and economic aspects, but are highly dependent on adequate institutional support. Institutions in this context include farmer organizations, the role of the state through agricultural development policies and programs, extension as a means of disseminating knowledge, and strategic partnerships between actors. These institutions are important instruments in building farmers' adaptive capacity, strengthening production networks, and ensuring the sustainability of innovations at the local level.

For this reason, this study examines the existing conditions of rice-fish integration farming institutions through four key aspects: the existence and function of farmer institutions, the role of government and policies, the capacity of extension institutions, and the forms of partnerships and collaborations that support cultivation practices. The analysis aims to evaluate the strengths and weaknesses of the current institutional structure, while also exploring opportunities for strengthening local institutions as part of a sustainable agricultural transformation.

1. Farmer Institutions

Farmer institutions are a fundamental aspect of a sustainable agricultural system, as they serve as the main forum for organizing cultivation activities, distributing information, and strengthening farmers' bargaining positions (Ma & Abdulai, 2016). Based on the research results, all rice-fish integration farmers in Epeesi Village are members of farmer groups spread across eight institutional units, each representing a hamlet where farmers live. Farmer groups, such as Samaturu, Mabbulo Sibatang, Pada Idi, and Makmur Jaya, act as socio-economic units where farmers share information and assist one another in the production process.

However, functionally, these institutions are still relatively weak. Farmer group activities are limited to organizing inputs and seasonal activities such as harvesting. Regular meetings are rarely held, and there is no collective farm business planning system in place. The institutions have not yet developed into agribusiness entities or farmer cooperatives that can provide broader support, such as product processing, collective marketing, or access to group-based capital. Regular meetings are rarely held, and there is no jointly developed long-term institutional plan in place. One farmer explained:

> "We usually get together when it is harvest time or when fertilizer assistance is available. Other than that, there are rarely any meetings or group discussions." (Interview, Farmer 03, Epeesi Village, 2024).

These limitations have an impact on the low role of institutions in encouraging collective innovation or adaptation to climate change.

"We want to be able to process our harvest or sell it together, but the group does not manage anything other than planting and harvesting." (Interview, Farmer 07, Epeesi Village, 2024).

The existence of groups tends to be administrative and has not yet developed into transformative institutions capable of providing broader services, such as processing, market access, or group-based financing.

"If there were training or mentoring for groups, maybe we could develop. But now we still work individually." (Interview, Farmer 02, Epeesi Village, 2024)

This reflects the weak *linkages* between farmer groups and the farming systems they run. When institutions are not operating optimally, the collective ability to adapt to market challenges and climate change is also limited (Hellin et al., 2009). Therefore, revitalizing farmers' institutions is crucial so that farmer groups do not merely become administrative formalities, but become the primary actors in the transformation of sustainable agriculture at the local level (Barrett & Constas, 2014).

2. Role of Government and Policy

The role of the government, particularly through the fisheries and agriculture offices, has had a significant but sporadic impact. In recent years, the government has implemented interventions in the form of fish seed assistance, feed, and aquaculture training, as seen in 2019 and 2022. Plans for further interventions in 2024 are also in development. However, there is no systemic, long-term policy program oriented towards strengthening the Rice-Fish Integration ecosystem as a whole. A farmer said:

"At that time, we received seed assistance from the agency, but after that, there was no more. So we did it ourselves, sometimes buying seeds with money from the harvest." (Interview, Farmer 06, Epeesi Village, 2024)

The absence of regulations or policy support that explicitly recognizes and promotes integrated farming in peatland areas makes government programs unsustainable. Most approaches are still project-based, dependent on annual budgets, and lack integrated cross-sectoral planning.

"Government programs usually only come once, and then there is no follow-up. If they were sustained, we would be more motivated." (Interview, Farmer 04, Epeesi Village, 2024)

In the context of sustainability, government intervention should lead to the establishment of an incentive system for farmers who maintain the function of swamp ecosystems through integrative agricultural practices (van Noordwijk et al., 2012). On the other hand, land conversion policies, legal status of land ownership, and area licensing also need to be reviewed so that they do not overlap with community management rights that have been going on for generations, as confirmed in a study on the link between tenure rights certainty and the sustainability of natural resource management (Robinson et al., 2014).

3. Extension Institutions and Access to Information

The presence of extension workers in the field is minimal. In one working area of Kecamatan Basala, there is only one agricultural extension worker, while there is no fisheries extension worker. This limited human resource has resulted in the low frequency of extension services received by farmers. Most farmers claim to have never received direct technical assistance from an extension worker in the past year. In this situation, farmers tend to seek information independently, primarily through social media and learning practices from fellow farmers.

"Extension workers have never visited us. If we want to learn, we usually ask other farmer friends or search on YouTube." (Interview, Farmer 01, Epeesi Village, 2024)

The lack of formal extension services not only hinders the slow adoption of innovations but also impedes the transfer of knowledge related to sustainable agriculture, climate risk management, and improved cultivation efficiency. Another farmer added:

"There used to be training, but only once. After that, there was no further information. We need guidance on fertilizers, planting distances, and fish care methods." (Interview, Farmer 10, Epeesi Village, 2024)

Research indicates that agricultural extension officers play a crucial role as facilitators, educators, and motivators in promoting the adoption of innovations by farmers (Nurida & Sitorus, 2024). Unfortunately, the limited number and quality of extension workers have led to farmers' low access to relevant information. This is reinforced by the findings of Lakatara et al. (2024), who revealed that farmers' knowledge of sustainable agricultural practices remains low due to the lack of effective extension services. Thus, improving the quality of extension services is an urgent need in supporting the transformation towards more efficient and sustainable agriculture (Yanfika et al., 2024). These findings indicate a structural imbalance between the potential productivity of rice-fish integration systems and the capacity of available extension institutions. Therefore, it is necessary to strengthen extension institutions at the village level, both through the addition of extension workers and the integration of locally based digital technology, so that technical information can reach farmers more quickly.

4. Partnership and Collaboration

The aspect of partnership and inter-agency collaboration in the development of integrated rice-fish farming is still minimal. Based on interviews, there is a lack of collaboration between farmer groups and research institutions, universities, or non-governmental organizations that can support the sustainable development of technology and socio-economic assistance. Most research in this area is academic, typically undertaken by students as part of their final assignments. There are no applied research schemes or collaborative development of rice-fish integration models that can be replicated in other locations. This indicates that the institutional recognition of farmers as knowledge producers is still lacking, despite their demonstrated local knowledge and hereditary practices that are well-suited to swamp ecology.

> "So far, there has been no cooperation with universities or external institutions. When students come, it is only for a short time for their assignments, then they leave." (Interview, Farmer 11, Epeesi Village, 2024)

Additionally, there is no synergy between farmer groups and financial institutions (cooperatives, BUMDes, banks) that can bridge access to capital, post-harvest management, or marketing. Local economic institutions such as farmer cooperatives are not yet established or active. Horizontal partnerships between farmers or networks of farmer groups across villages have also not been initiated to share experiences and strengthen bargaining positions in the market.

> "Our group has never been invited to collaborate. When it comes to funding or marketing, we handle it individually. There are no cooperatives or village institutions that help us." (Interview, Farmer 15, Epeesi Village, 2024)

Collaboration opportunities should be directed towards a *co-creation* model between farmers, researchers, and the village government in building a rice-fish integration system as a community-based agroecology model. This model will enable knowledge co-production, the development of locally based technologies, and the institutionalization of sustainability values in policy-making at the site level.

All of these findings reflect the importance of revamping the overall institutional structure. Developing rice-fish integration as a resilient and sustainable agricultural model requires not only technical improvements but also institutional strengthening at all levels. Institutional reforms, such as strengthening function-based farmer groups, providing active cross-sectoral extension services, creating government incentive schemes, and establishing knowledge-based partnership networks, are crucial. Wang et al. (2021) emphasized that the success of sustainable agriculture is primarily determined by the effectiveness of extension services integrated in a strong institutional system. In the context of adapting to climate change, Mungai et al. (2024) demonstrated that the presence of responsive and collaborative extension services across various sectors strongly supports farmers' capacity to adopt adaptive practices. In addition, Mapiye & Dzama (2024) emphasized the need for integration between research, extension, and farmer systems to strengthen knowledge transfer and participatory adoption of innovations. Strong local institutional support, as revealed by Listiana et al. (2021), is also crucial in maintaining the sustainability of community-based food production and security.

The results of this study indicate that the development of integrated rice-fish farming in lebak swamplands is primarily determined by the synergy between social strength based on local wisdom and community cohesion, economic resilience through income diversification and household food

security, and farmer institutions which, although still weak, have strategic potential to be developed through partnerships and strengthening the role of the state. These three aspects are interconnected in creating the foundation of an agricultural system that is not only productive, but also adaptive to environmental and socio-economic pressures. Therefore, the transformation of integrated rice-fish farming towards sustainability is not sufficient only through technical approaches, but demands integrated interventions that mainstream local values, strengthen institutional networks, and policies that prioritize farmers as the primary subjects of sustainable agricultural development.

CONCLUSIONS AND SUGGESTION

This research reveals that the integrated rice-fish farming system operated by farmers in the South Konawe District is a form of community-based agricultural practice that possesses a strong sustainability dimension, yet still faces various structural challenges. Socially, this system is supported by ethnic-based community cohesion, family participation in production, and the preservation of local wisdom that provides adaptive value to agroecological and social dynamics. On the economic side, rice-fish integration enables the production of a diverse combination of food and income, strengthens household food security, and demonstrates efficiency through a low-cost and low-risk farming model. However, access to modern markets and capital is still limited. Meanwhile, from an institutional aspect, farmer groups and government support have been established but not systemically integrated. Institutional functions are not yet optimal as a driver of innovation and liaison between agricultural actors, while extension and collaboration between institutions are still very minimal. This imbalance suggests that the sustainability of the system is not solely determined by technical aspects, but also by strengthening the institutional and social capacities of the farmers themselves.

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