

Strategy for Strengthening Farmers' Groups in Sustainable Natural Resources Management in Lempuing District, OKI Regency

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ABSTRACT

Water resources are vital in supporting agriculture and improving community welfare. Effective water resource management involves planning, implementation, monitoring, and evaluation of conservation, utilization, and damage control. This study aims to identify challenges faced by farmer groups, assess farmer participation levels, evaluate the effectiveness of existing programs using the Social Return on Investment (SROI) method, and design sustainable capacity development strategies through SWOT analysis. Results indicate that the participation level of the Jaka Tingkir Farmer Group in water resource management is relatively high (67%), corresponding to the sixth level of Arnstein's participation ladder (partnership). However, decision-making involvement remains limited, highlighting the need for education and training. The SROI analysis produced a ratio of Rp1:Rp1.26, demonstrating that the irrigation management training program yields significant social, economic, and environmental benefits, including improved technical capacity, water-use efficiency, productivity, and institutional resilience. Through SWOT, IE, and QSPM analyses, three priority strategies were identified strengthening climate-resilient infrastructure, developing cross-sectoral collaboration networks, and submitting funding proposals. The study implies that sustained mentoring, water-saving technology training, and institutional strengthening are essential to enhance farmer participation and ensure sustainable water resource management that supports long-term food security and rural communities.

Keywords: *Farmer Groups, Farmer Participation, SROI, SWOT, Water Resources*

BACKGROUND

Water resources are vital for agriculture in Lempuing District, Ogan Komering Ilir (OKI) Regency, a rice-growing center in South Sumatra. This area covers 295.47 km², dominated by irrigated land with a potential of 13,500 ha through the Lempuing Irrigation Area. However, infrastructure damage, such as to the BK 19 Dam and a 9-km canal, disrupts water distribution to 5,650 ha of rice fields, reducing productivity and threatening food security (BPS OKI, 2022; BSIP South Sumatra, 2023). Strengthening the capacity of farmer groups is key to sustainable water

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management. Through a participatory approach, they can play an active role in maintaining and improving irrigation networks. Currently, challenges faced include limited technical skills, weak institutions, limited knowledge of water efficiency, and poor coordination between groups. Climate change, which affects rainfall and water availability, further reinforces the urgency of implementing efficiency principles, infrastructure maintenance, and farmer empowerment (Ministry of Agriculture, 2023).

Previous studies (Imriyanti et al., 2025) have examined community participation in irrigation management, yet most focus on technical aspects rather than institutional and social empowerment. Few have integrated these dimensions to assess their combined effect on sustainable water governance. Therefore, this study aims to fill that gap by analyzing the role of farmer group participation in water resource management and identifying factors that influence its effectiveness. The novelty of this research lies in integrating institutional, technical, and participatory perspectives to develop a more holistic model of community-based water resource management. This innovative approach emphasizes the synergy between infrastructure maintenance and social capacity building to ensure long-term water sustainability. Accordingly, the study hypothesizes that higher levels of farmer participation, supported by institutional capacity and government facilitation, significantly enhance the effectiveness and sustainability of local water resource management.

RESEARCH METHODS

This research will be conducted in Lempuing District, Ogan Komering Ilir Regency, South Sumatra, with the Farmer Group in Cahya Maju Village as the subject during February–March 2025. The research data includes primary data in the form of structured interviews and questionnaires, as well as secondary data from agency publications, regulations, and related literature. The study population comprised 27 farmer groups within the Lempuing Irrigation Area. The sample was determined using purposive expert sampling, involving a total of 30 respondents who were representatives from the 27 farmer groups. Each farmer group was represented by its group leader or administrator, while additional respondents included members of the local Water User Association (P3A). Specifically, the sample consisted of 4 irrigation administrators and 26 P3A members, ensuring that the perspectives of both management and farmer-level participants were included.

The analysis was conducted quantitatively and qualitatively. Respondent characteristics were described descriptively, while the level of farmer participation in water resource management was measured using the Hurairah (2008) approach and mapped based on Arnstein's (1969) ladder of participation. The social, economic, and environmental impacts of government policies and programs were analyzed using the SROI method based on the NPV principle. SWOT and QSPM were used to formulate strategies for strengthening farmer groups for more effective, efficient, and sustainable water resource management.

Table 1 shows that the Jaka Tingkir Farmers Group's participation level in irrigation management is at the partnership stage (level 6 on Arnstein's participation ladder, score 401). Damanik & Purba (2019) explain that the partnership stage is a pattern of cooperation carried out by both parties involved in resource management. In this case, farmers are considered equal partners,

although decision-making and managerial authority still predominantly rests with the government. Partnerships are usually formed between partners when there are shared interests, needs, mutual reinforcement, or mutual benefit.

Table 1. Recapitulation of Jaka Tingkir Farmer Group Participation Level Scores

Activity Description	Score
Planning stage	
- Attend P3A outreach/guidance activities	49
- Participate in irrigation water distribution and planting planning	52
Implementation stage	
- Involved in Funding and Material Contributions	54
- Involved in Inspecting/Tracking Irrigation Channels	52
- Removing Weeds/Weeds Around Channels	55
Maintenance Stage	
- Cleaning Drains of Trash	55
- Removing Mud/Sediment from Irrigation Drains	49
- Applying Oil/Lubrication to Sluice Gates	35
Total criteria score	401

Source: Data Processed, 2025

However, they can also arise from other factors, such as encouragement and development (Damanik & Purba, 2019). In this study, partnerships were created based on encouragement and development for farmers to further develop their ability to manage and provide resources to the community. Specifically, this form of partnership is aimed at empowering the community through capacity building, provision of facilities, and training to enable farmers to become more independent in managing water resources.

RESULTS AND DISCUSSION

Overview of the Research Area and Respondent Characteristics

Lempuing District (OKI Regency, South Sumatra) is approximately 72 km from the capital of Ogan Komering Regency, South Sumatra Province. The area is 295.47 km² with 19 villages, centered in Tugumulyo. The area is a lowland area of approximately 10 meters above sea level with a tropical climate (dry season May - October, rainy season November - April). The population in 2023 was 75,105 people (BPS OKI Regency 2024). The main water sources for agriculture are the Bengkulah River which irrigates approximately 5,650 ha of rice fields, the Tertiary Irrigation Canal Block G (approximately 105 ha), and the BK 19 Dam, whose condition is damaged, disrupting water distribution.

The Jaka Tingkir Farmers Group (legally incorporated in 2020) consists of 119 farmers from Cahya Maju and Tebing Suluh Villages. Its goal is to manage tertiary irrigation to improve the welfare of its members. A sample of 30 people was selected, considering data limitations and the principle of data saturation. All respondents will be presented in the table 2.

Table 2. Respondent Characteristics and Condition

Characteristic	Category	Percentage (%)	Description
Gender	Male	100	All respondents were male
Age (years)	31–40	40	Majority in productive age
Education level	High school	44	Majority had secondary education
Main occupation	Farmer	100	All respondents worked as farmers
Land area managed (m ²)	7,500–10,000	—	Majority managed medium-sized land
Farming experience (years)	21–25	—	Most had long-term experience
Average gross income (IDR/month)	> 6,000,000	—	Above regional minimum wage

Source: Data Processed, 2025

Forms and Levels of Farmer Participation

The agricultural sector, established by the Indonesian people, aims to improve the welfare of the people. The role of the agricultural sector is to provide food resources for the community and manage other resources. Success in meeting these resource needs is influenced by the attitudes and participation of farmers (Lestari et al., 2024). Farmer participation in resource management can impact the fulfillment of the community's daily needs. According to Putri et al. (2019), the reason farmers need to participate is to ensure proper management of their farming businesses. These farming activities include producing raw materials for food for the community, raw materials for industry, exporting agricultural products, and managing water resources. Water and irrigation resource management is seen as a key component for increasing food security, according to Putriani et al. (2018).

Farmer participation is divided into three stages: planning, implementation, and maintenance. This aligns with research by Putri et al. (2019) that divides participation into planning, implementation, and evaluation. The following is a description of farmer participation activities.

Table 3. Participation of Respondents from the Jaka Tingkir Farmer Group

Activity Description	Actively involved (%)	Not involved(%)
Planning stage		
- Attend outreach or coaching activities from P3A	63	37
- Follow the Irrigation Water Distribution Scheduling and Planting Arrangements	73	27
Implementation stage		
- Involved in Funding and Material Contributions	80	20
- Involved in Irrigation Channel Checking and Tracing	73	27
- Remove weeds and weeds around the drains	83	17
Maintenance Stage		
- Cleaning the Channel from Trash	83	17
- Lifting mud or sediment in irrigation channels	63	37
- Applying oil or lubricant to the water gate	17	83
Average	67	33

Source: Data Processed, 2025

The participation stage in water resource management by the Jaka Tingkir farmer group is reflected in four main forms: intellectual, physical, material, and social participation. **First**, intellectual participation can be described as concrete actions and initiatives taken by farmers in implementing the agreed-upon work plan of farmer group members. This can foster the strengths within the farmer group and mobilize and encourage farmer behavior toward achieving group goals, thereby further developing the farmer group (Nahak et al., 2024). In this study, intellectual participation was evident in the preparation of technical plans, as seen in Table 1, where 63%–73% of respondents actively provided input regarding management flows, water distribution scheduling, and proposals for the construction of small dams.

Second, labor participation in implementing and maintaining activities is illustrated by direct participation in water resource management activities. This can realize activities and provide solutions in water resource management (Nahak et al., 2024). In this study, labor participation was evident in the implementation and maintenance stages, with 73%–83% of members directly involved, for example, in removing weeds, cleaning channels of trash and sediment, and maintaining the function of sluice gates, although not all had specialized maintenance skills. This demonstrates a collective awareness that transcends formal direction as reflected in the voluntary participation of farmers in canal cleaning, mutual assistance and monitoring activities, but rather fosters shared responsibility.

Third, participation in the form of assets can be illustrated by voluntarily donating a portion of their assets as a contribution to achieving goals (Budhi & Aminah, 2009). This study demonstrates the financial participation of farmers, including regular member contributions (80%) for operational and maintenance costs, as well as material donations or emergency funds in the event of sudden damage. **Fourth**, social participation can be identified as farmers' contributions to collaborative activities, particularly in water resource management. This study demonstrates that social participation is evident in collaborative activities such as cleaning water channels and harvesting together (Dorre, 2020). These four forms of participation reflect horizontal participation, where community members participate equally and independently. In this case, there is a link between farmer groups and farmer participation, indicating that community organizations play a role in assisting farmers, both as initiators, catalysts, and facilitators (Anwarudin, 2017).

However, participation in skills and expertise has not been widely seen due to limited capacity and low levels of farmer education. According to Marphy & Priminingtyas (2019), education encourages farmers' motivation and ability to be more actively involved. Therefore, capacity building needs to be strengthened through education, training, and professional counseling. Agricultural extension is needed to assist farmers so that agricultural development can run optimally. In line with the view of Nahak et al. (2024), the more frequent agricultural extension activities are carried out, the more it will affect the quality of the group and provide changes in farmer behavior, knowledge, and insight to farmers in running their farming businesses. The implementation of extension activities requires participation between farmers and agricultural extension workers so that the agricultural extension activities carried out can achieve the planned objectives. Putri et al. (2019) outline three stages of extension activities: planning, implementation, and maintenance.

Defining the Scope and Identifying Stakeholders

The results of the study in Lempuing District (OKI Regency) show that the Jaka Tingkir Farmer Group demonstrates active participation in irrigation management through four main forms: intellectual, labor, material, and social participation. Intellectual participation is reflected in the involvement of 63–73% of farmers in planning and decision-making, such as preparing technical plans and irrigation schedules. Labor participation, with 73–83% involvement, appears in activities such as cleaning irrigation channels, removing weeds, and maintaining sluice gates. Material participation is realized through regular financial contributions by 80% of members for operational and maintenance costs, as well as donations for emergencies. Social participation is evident in collective activities, such as cleaning water channels and harvesting together. Based on the total participation score (401), the Jaka Tingkir Farmer Group's participation level is categorized at the partnership stage (level 6 of Arnstein's participation ladder), where farmers act as equal partners with the government in managing irrigation resources.

These findings show that farmers in Lempuing District have developed active and collaborative participation in managing irrigation resources, reflecting strong community cooperation. The partnership stage achieved indicates shared responsibility between farmers and the government in maintaining irrigation systems. However, participation quality remains constrained by limited education and technical capacity. Therefore, strengthening farmer capacity through training, counseling, and institutional support is essential to enhance independence and sustainable agricultural management. Determining the scope is the initial step in an SROI analysis, encompassing the objectives, funding, objectives, purpose, timeframe, and evaluation approach. This analysis focuses on the Jaka Tingkir Farmers Group's Irrigation Water Resources Management Training, which aims to improve farmers' capacity in the distribution, maintenance, and utilization of appropriate technology to make irrigation management more efficient, sustainable, and support agricultural productivity. This activity is supported by funding from the central and regional governments, as well as non-financial contributions from farmer groups, such as volunteer labor and active participation in discussions and field practices. An SROI analysis is conducted evaluatively to measure the resulting social, economic, and environmental impacts, both short- and long-term, while also assessing the effectiveness of training investments. According to Ekawati et al. (2023), SROI analysis is a framework used to measure and calculate the value created by a program or series of initiatives, beyond financial value.

The next step is to identify stakeholders involved and impacted by the program. In this context, stakeholders include farmer group members as primary participants, training facilitators, village and regional governments, agricultural extension workers, and the surrounding community, who benefit from the farmers' improved water resource management skills. The involvement of these stakeholders is crucial to ensure that the training outcomes are more participatory, relevant to local needs, and support the sustainability of collective irrigation management.

Mapping the Impact

Once the scope is established, the next step in the SROI analysis is to map benefits through an impact map, identifying inputs, outputs, and outcomes. The impact map illustrates the cause-and-

effect relationship between problems, actions, and expected outcomes. Inputs include resources used, such as outreach activities, training, physical funds, land, and community contributions in the form of funds, labor, and goods. The value of inputs is calculated not only in terms of financial aspects, but also in terms of time and active participation of stakeholders who support the success of the water resources management program.

Table 4. Assigning Input Values to Natural Resource Management Programs

No	Input	Quantity	Unit	Unit price (Rp)	Total cost (Rp)
1	Socialization Activities	2	Activity	15.000.000	30.000.000
2	Training Activities	1	Activity	103.307.700	103.307.700
3	Physical Fund Budget	1	Rupiah	1.060.680.147	1.060.680.147
4	Land and Land Access	39	M ²	300.000	11.700.000
5	Community contribution	1	Year	60.000.000	60.000.000

Source: Data Processed, 2025

These inputs generate outputs in the form of community involvement in outreach, increased farmer technical competency through training, irrigation infrastructure development, land access, and community service contributions. These outputs then produce tangible outcomes such as increased farmer awareness of water conservation, efficient water distribution, reduced inter-farmer conflict, the formation of stronger farmer institutions, and increased agricultural productivity. These impacts demonstrate the significant social and economic value of the Jaka Tingkir Farmers Group's natural resource management program.

Based on the table 4, Physical Fund Budget allocation of Rp 1.06 billion is considered large because it covers the construction and rehabilitation of irrigation infrastructure such as tertiary channels, sluice gates, and supporting facilities that require high material and labor costs. Meanwhile, the smaller training and socialization budgets only cover short-term non-physical activities. This difference indicates that physical activities are capital-intensive, while capacity-building focuses more on human resource development. Therefore, the large physical fund is considered proportional as it represents a long-term investment in agricultural infrastructure.

Heather, as cited in Ekawati et al. (2023), explains the benefits of using SROI analysis, including: (1) Program credibility – SROI facilitates organizations in communicating the impact of their programs; (2) Capacity – SROI provides information on the extent of resources invested in a program; (3) Evidence – SROI demonstrates that organizations collect and manage data and knowledge, making the program viable; and (4) Sustainability – SROI is a powerful communication tool for securing funding. The following provides a more detailed description of the outcomes of the SROI analysis used in this study.

Table 5. Describing the Outcome

No	Output	Outcome
1.	Number of participants in the socialization activities	1. Increasing farmer awareness of the importance of water conservation and sustainable irrigation management.

No	Output	Outcome
		2. Increasing community participation in meetings, discussions, and community service activities on irrigation networks.
2.	Number of participants in training activities	1. Improving the technical capacity of P3A members in managing water distribution, maintaining canals, and recording water discharge. 2. Improving the institutional capacity of farmer groups in planning and reporting activities. 3. Improving the efficiency of water use and reducing water loss.
3.	a. Construction of water conservation structures and tertiary networks. b. Development of standard operating procedures (SOPs) for water management and group institutions. c. Availability of water discharge information boards and a turn-based management system.	1. Increased agricultural productivity due to fairer and more efficient water distribution. 2. Reduced horizontal conflicts between farmers regarding water distribution. 3. Creation of local employment opportunities during infrastructure development and maintenance. 4. Enhanced reputation of farmer groups as local development partners. 5. Establishment of a culture of mutual cooperation in irrigation maintenance and reporting technical issues.

Source: Data Processed 2025

Proving Impact and Assigning Value

Outcome indicators are designed to measure the outcomes of water resource management by the Jaka Tingkir Farmers Group, encompassing institutional, technical, and social aspects, including agricultural productivity. These indicators include changes such as increased awareness of water conservation, community service participation, efficient water use, and the development of a culture of mutual cooperation. Furthermore, any impacts that cannot be directly measured are valued through financial proxies, allowing social and environmental benefits to be monetized in rupiah. This monetization process is conducted by referring to field data, interview results, and relevant previous research references.

Table 5 describes the outcomes obtained from the Social Return on Investment (SROI) analysis used in this study. The table aims to present a clearer linkage between the outputs (such as the number of participants in socialization and training activities, infrastructure development, and standard operating procedures) and the outcomes achieved (such as increased awareness, technical capacity, and water management efficiency). This table serves to demonstrate how participatory irrigation programs contribute to tangible social and economic benefits for farmer groups. The purpose of this table is to highlight how each intervention or program activity generated measurable outcomes that support sustainable irrigation management and community empowerment. Through these activities, the study underscores the practical and institutional impacts that arise from the collaboration between farmer groups, local institutions, and supporting agencies. For instance, research by Santoso Agung Budi et al. (2023) found that farmer participation in irrigation network maintenance increased productivity and reduced conflicts over water use. Similarly, Giri & Chattopadhyay (2024) reported

that training programs and technical assistance improve the institutional capacity of farmer associations, leading to better decision-making and sustainable resource use.

Table 6. SROI Valuation: Financial Proxy for Natural Resource Management of the Jaka Tingkir Farmers Group

No	Impact	Financial Proxy	Value/Unit (Rp)	Units per Year	Total Impact (Rp)
1	Increased water conservation awareness	Socialization costs per farmer	500.000	100 farmer	50.000.000
2	Participation in community service projects on irrigation networks	Community service consumption	2.000.000	12 activity	24.000.000
3	Increased technical capacity of P3A (Plant-based Agricultural Units)	Training costs per person	1.000.000	100 person	100.000.000
4	Strengthening farmer group institutions	Institutional support value	2.000.000	1 institutional	2.000.000
5	Water use efficiency	Estimated water savings per hectare	500.000	100 ha	50.000.000
6	Increased agricultural productivity	Yield difference per hectare	10.000.000	100 ha	1.000.000.000
7	Reduced horizontal conflict	Social costs of conflict resolution	1.500.000	2 conflict	3.000.000
8	Local employment opportunities created	Local labor wages	600.000	100 working days	60.000.000
9	Group reputation enhanced	Value of support or cooperation	2.500.000	4 cooperation	10.000.000
10	Created a culture of mutual cooperation	Value of social activities	1.000.000	12 activity	12.000.000
Total Annual Impact Value					1.311.000.000

Source: Data Processed by Researchers, 2025

In this study, the impact duration was set at five years considering that most outcomes, such as increased institutional capacity, irrigation efficiency, and agricultural productivity, require time to stabilize and be consistent. This step aligns with the principle of establishing impact in SROI analysis. Ekawati et al. (2023) explain that the SROI methodology can be used for two purposes: (1) Evaluative, conducted retrospectively and based on actual results that have occurred. (2) Forecasting, which predicts how much social value will be created if activities meet desired outcomes. In this study, SROI analysis is used for forecasting in predicting value through financial proxies. SROI uses financial proxies to help conceptualize the value of changes experienced by stakeholders as a result of the activities being studied. To establish financial proxies, there needs to be a structured activity designed to produce the same or similar results. Through a stakeholder engagement process, the process of establishing financial proxies is validated (Ekawati et al., 2023).

Table 6 presents the SROI valuation for natural resource management conducted by the Jaka Tingkir Farmers Group. The financial proxies were derived from the actual costs of outreach and training programs, supported by in-depth interviews with farmer group leaders, agricultural extension officers, and irrigation managers. Unit values were based on real expenditure data and validated through stakeholder discussions to ensure credibility. This approach aligns with Giri and Chattopadhyay (2025), who highlight that combining empirical cost data with participatory valuation methods enhances the accuracy and reliability of SROI analyses in agricultural and irrigation programs.

Determining the Impact

In the fourth stage of the SROI analysis, impact determination is carried out using the "do not overclaim" principle, which only calculates the actual contribution of the Jaka Tingkir Farmers Group's water resource management program. Impacts influenced by external factors such as government assistance, third-party training, or market conditions are only partially calculated based on the program's contribution. The evaluation is conducted using three main components: deadweight (impacts that would have occurred without the program), attribution (portion of impacts from other parties), and displacement (impacts that displace other benefits). This calculation produces a more realistic and credible net impact value (Ekawati et al., 2023).

Table 7. Net Impact Calculation – SROI of the Jaka Tingkir Farmers Group

No	Impact	Total Impact (Rp)	Deadweight (%)	Attribution (%)	Displacement (%)	Net Impact (Rp)
1	Increased water conservation awareness	50.000.000	25	25	0	28.125.000
2	Participation in community service projects on irrigation networks	24.000.000	50	50	0	6.000.000
3	Increased technical capacity of P3A (Plant-based Agricultural Units)	100.000.000	0	0	0	100.000.000
4	Strengthening farmer group institutions	2.000.000	0	25	0	1.500.000
5	Water use efficiency	50.000.000	25	25	25	21.093.750
6	Increased agricultural productivity	1.000.000.000	25	50	25	281.250.000
7	Reduced horizontal conflict	3.000.000	25	25	0	1.687.500
8	Local employment opportunities created	60.000.000	75	50	25	5.625.000
9	Group reputation enhanced	10.000.000	25	25	0	5.625.000
10	Created a culture of mutual cooperation	12.000.000	50	50	0	3.000.000

Source: Data Processed, 2025

The analysis results show variations in the program's contribution to various outcomes. Impacts entirely attributable to the program include increased technical capacity of WUAs and institutional strengthening, while outcomes such as water efficiency, agricultural productivity, or job creation can only be partially claimed due to external factors and displacement. The total net impact in the first year was recorded at IDR 453,906,250, assuming a 15% annual drop-off. Therefore, the analysis provides a more accurate picture of the program's social value and maintains the credibility of the SROI calculation. The percentages of Deadweight and Attribution are determined based on the SROI approach through interviews, surveys, or stakeholder assessments to identify outcomes that would occur without the program and those influenced by external factors. These estimates are then validated using expert judgment or comparative references from previous SROI studies to ensure credibility.

Calculating the Social Return on Investment (SROI) Ratio

In the SROI analysis, program benefits are projected over five years because impacts such as institutional strengthening, irrigation efficiency, and increased productivity are sustainable. The calculation was carried out using the Net Present Value (NPV) approach with a discount rate of 3.5% according to the standard social discount rate. The results show a net impact value of IDR 453.9 million in the first year, which then decreases annually due to drop-off and discounting, so that in five years the total NPV reaches IDR 1.59 billion. This value reflects a more realistic net benefit after accounting for reducing factors such as deadweight, attribution, and displacement. The following is the SROI calculation using the formula proposed by Scholten P., Nicholls, J., Olsen S. & Galimidi, B. in Ekawati et al. (2023), as follows:

$$\begin{aligned}\text{SROI Ratio} &= \frac{\text{Present Value of Benefits}}{\text{Value of Input}} \\ &= \frac{1.590.634.762}{1.265.687.847} \\ &= 1,257\end{aligned}$$

Based on the above results, the SROI ratio was calculated by comparing the discounted net benefit value with the total program investment. With an input of IDR 1.26 billion, the SROI ratio was 1.26. This means that every IDR 1 invested in the water resource management program by the Jaka Tingkir Farmers Group generates IDR 1.26 worth of social and economic benefits. This ratio indicates that the program is socio-economically feasible and has a significant positive impact on farmers and stakeholders. This finding aligns with previous research by Ekawati et al. (2023), who reported SROI ratios ranging from 1.20 to 1.35 in similar community-based irrigation and agricultural development programs. These comparable results indicate that such participatory programs are socio-economically feasible and consistently deliver positive impacts on farmers and stakeholders

Strategy for Strengthening Farmer Groups in Sustainable Natural Resource Management

Sustainable water resource management is crucial for the Jaka Tingkir Farmers Group in Cahya Maju Village because water is not only a basic agricultural need but also plays a role in maintaining

farmers' economic stability, food security, and environmental balance. To ensure future water availability, an appropriate management strategy is required, considering both internal and external factors. This strategy formulation is based on a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, which serves as the basis for developing effective and adaptive water resource management steps (Herjito & Setiawan, 2021). The SWOT method is used to analyze and then formulate strategies based on internal and external factors that influence aspects of water resource management.

Identification of Internal and External Factors

The formulation of a natural resource management strategy in Cahya Maju Village was conducted through a SWOT analysis, identifying internal and external factors based on information from farmers, village officials, the agricultural office, and academics. An internal environmental analysis was conducted to identify strengths and weaknesses in the resource program (Herjito & Setiawan, 2021).

The analysis revealed 10 internal factors (6 strengths and 4 weaknesses) with a total score of 2.90, indicating that strengths were dominant. Key strengths included collaborative experience, participation in decision-making, awareness of sustainable management, adequate infrastructure, a culture of mutual cooperation, and the village's strategic position. However, remaining weaknesses included limited funding for canal repairs, difficulties with cross-village collaboration, limited skilled labor, and inadequate water availability.

Table 8. IFE Matrix – Internal Factor Evaluation

No	Internal Factors	Weight	Rating	Score
Strength Indicators				
1	Farmers have experience in collaborating	0,10	3	0,30
2	Farmers are involved in decision-making	0,10	3	0,30
3	Farmers are aware of the importance of sustainable water management	0,10	3	0,30
4	Water management infrastructure is adequate	0,09	3	0,27
5	Farmers often work together in natural resource management	0,10	3	0,30
6	The village is strategically positioned to establish partnerships	0,10	3	0,30
Total Power (S)		0,59		1,77
Weakness Indicators				
1	Difficulty in cooperating with other villages	0,10	3	0,30
2	Lack of funds for channel repairs	0,11	3	0,33
3	The amount of water received is not sufficient	0,10	2	0,20
4	Shortage of skilled irrigation workers	0,10	3	0,30
Total Weakness (W)		0,41		1,13
Total		1,00		2,90

Source: Data Processed by Researchers, 2025

External environmental analysis indicates opportunities and threats in water resource management (Herjito & Setiawan, 2021). External factors recorded 6 indicators (3 opportunities and

3 threats) with a total score of 3.00. Key opportunities include support for water management programs (score 0.52), adoption of irrigation technology (0.45), and partnerships with industry (0.40). Meanwhile, the biggest threats were infrastructure damage (0.57), conflicts of interest between parties (0.54), and the impact of climate change (0.53). The results indicate that despite significant risks, the available external opportunities are still strong enough to be utilized, enabling the Jaka Tingkir Farmers Group to develop more adaptive and sustainable water management.

Table 9. EFE Matrix – External Factor Evaluation

No	External Factors	Weight	Rating	Score
Opportunity Indicator				
1	The existence of technology that makes irrigation easier	0,15	3	0,45
2	Water management cooperation with other industries	0,13	3	0,40
3	The existence of natural resource support projects or programs	0,17	3	0,52
Total Chances (O)		0,45		1,36
Threat Indicators				
1	Climate change and severe weather	0,18	3	0,53
2	Damage to water management infrastructure	0,19	3	0,57
3	Conflict of interest/sectoral ego	0,18	3	0,54
Total Threat (T)		0,55		1,64
Total		1,00		3,00

Source: Data Processed by Researchers, 2025

Internal-External (IE) Matrix

The IE matrix serves to develop strategies based on the research findings within the matrix. The IE matrix uses the total weighted IFAS score as the x-axis and the total weighted EFAS score as the y-axis (Firnanda et al., 2023). Based on the IFE (2.90) and EFE (3.00) matrix scores, the Jaka Tingkir Farmers Group is in quadrant II with a grow and build strategy, namely developing sustainable water resource management by strengthening internal factors and exploiting external opportunities. This strategy can be realized by optimizing support from the government, agencies, and private partners in the form of empowerment programs, training, and the provision of infrastructure, while simultaneously strengthening member capacity through skills development, institutional management, and efficient irrigation technology.

Formulating Alternative Strategies Using the SWOT Matrix

Based on the identification of various internal and external factors, the next step is to develop strategic factors by constructing a SWOT matrix (Herjito & Setiawan, 2021). The next step after constructing the IE Matrix is the matching stage using the SWOT Matrix, which combines the previously identified internal and external factors. This process yields relevant alternative strategies for water resource management by the Jaka Tingkir Farmers Group, which are then outlined in the SWOT Matrix. The analysis yielded 10 strategies: 3 SO strategies, 2 WO strategies, 2 ST strategies, and 3 W T strategies.

According to Firnanda et al. (2023), an SO strategy is an organizational mindset that utilizes all strengths and maximizes opportunities. A ST strategy aims to overcome threats using existing strengths. A WO strategy minimizes existing weaknesses by capitalizing on opportunities. A WT strategy focuses on defensive actions and seeks to minimize weaknesses and avoid existing threats. The strategy includes utilizing modern technology based on mutual cooperation, developing cross-sector partnerships, optimizing villages' strategic positions for program access, submitting proposals for canal repair funding, and training irrigation workers. Additionally, other strategies include strengthening infrastructure to address extreme climates, establishing collective agreements to prevent conflict, establishing cross-sector collaboration networks, internal technical training, and inter-village coordination forums. All of these strategies are designed to strengthen institutions, increase technical capacity, and ensure sustainable water management.

Determining Priority Strategies using the Quantitative Strategic Planning Matrix (QSPM)

The formulation of a water resource management strategy by the Jaka Tingkir Farmers Group was conducted using a SWOT matrix, then prioritized using a Quantitative Strategic Planning Matrix (QSPM) analysis. The function of the QSPM is to determine which strategies to prioritize when selecting from previously analyzed alternative strategies (Baroto & Purbohadiningrat in Firnanda et al., 2023). The steps for QSPM matrix analysis, according to Firnanda et al. (2023), are: 1) Compile a list of internal and external research key factors in the left column of the QSPM. This analysis uses the results of the IFAS and EFAS matrices. 2) Assign weights to external and internal factors (the weights assigned correspond to the weights in the IFAS and EFAS matrices). 3) Evaluate the matrix in step 2 (matching) and identify alternative strategies that the manager should consider implementing. 4) Determine attractiveness scores (AS), defined as numbers that express the relative attractiveness of each strategy within a given set of alternatives.

By calculating the Total Attractiveness Score (TAS) based on the weighting of internal and external factors from the IFE and EFE matrices, the attractiveness ranking of the strategies presented in the QSPM matrix was obtained. The results revealed ten alternative strategies with varying levels of priority, which then served as the basis for decision-making to improve water management effectiveness. Based on the analysis, the three strategies with the highest TAS scores were prioritized: strengthening water management infrastructure to withstand extreme climates (TAS = 6.32), establishing cross-sectoral collaboration networks to anticipate infrastructure damage (TAS = 6.32), and submitting a funding proposal to repair irrigation channels (TAS = 6.31). These strategies were deemed capable of addressing the group's internal limitations, capitalizing on external opportunities in the form of government and partner support, and mitigating the threat of climate change. This collaborative approach aligns with previous research findings that emphasize the effectiveness of multi-stakeholder participation in the development and maintenance of irrigation infrastructure.

CONCLUSION AND SUGGESTIONS

The study indicates that the participation of the Jaka Tingkir Farmers Group in water resource management is relatively high, encompassing thought, energy, property, and social aspects, and reaching the partnership level in Arnstein's participation ladder. However, farmers' involvement in

decision-making remains limited, highlighting the need for continuous capacity building through education and training. The SROI analysis confirms that the irrigation management training program provides substantial social, economic, and environmental benefits by enhancing technical competence, improving water use efficiency, increasing agricultural productivity, and strengthening farmer institutions, although these results are influenced by external factors. The SWOT, IE, and QSPM analyses identify strategic directions focused on reinforcing irrigation infrastructure resilience, building cross-sectoral collaboration networks, and enhancing funding initiatives.

Nevertheless, this study acknowledges certain limitations, particularly regarding the use of proxy indicators in the SROI analysis, which may not fully capture intangible social impacts, and the subjectivity inherent in the QSPM analysis that may affect the prioritization of strategies. Future research should refine proxy valuation methods with more empirical data, adopt participatory approaches to minimize bias in strategic assessment, and conduct longitudinal evaluations to assess the long-term sustainability of farmer participation and water resource management outcomes.

REFERENCE

- Anwarudin, O. (2017). Faktor Penentu Partisipasi Petani pada Program Upaya Khusus (Upsus) Padi di Kabupaten Manokwari, Papua Barat. *Jurnal Penyuluhan Pertanian*, Vol. 12 (1). DOI: <https://doi.org/10.51852/jpp.v12i1.342>
- Arnstein, S. R. 1969. A ladder of citizen participation. *Journal of the American Institute of Planners*, 35(4), 216–224. <https://doi.org/10.1080/01944366908977225>
- Hurairah, A. 2008. *Sosiologi Partisipasi: Membangun Partisipasi Masyarakat dalam Pembangunan Sosial*. Jakarta: Kencana.
- [BPS] Badan Pusat Statistik Kabupaten Ogan Komering Ilir. 2022. Kecamatan Lempuing dalam Angka 2022.
- [BPS] Badan Pusat Statistik. 2024. Berita Resmi Statistik 5 Februari 2024.
- [BSIP] Badan Standardisasi Instrumen Pertanian Sumsel. 2023. Verifikasi Bendungan dan Saluran Irigasi di Kabupaten OKI.
- Budhi Gelar Satya & Aminah Mimin. (2009). Pattern Of Farmers' Participation: Lessons From Pump Irrigation Project Pola Partisipasi Petani: Pelajaran dari Proyek Irigasi Pompa. *Analisis Kebijakan Pertanian*, Vol. 7 (4), pp. 351–368.
- Damanik, S.E., Purba, S. (2019). Perencanaan Pola Kemitraan dalam Peningkatan Kesejahteraan Petani KPH XIII Kawasan Dolok Sanggul Kabupaten Humbang Hasundutan. *Sebatik*, Vol. 23 (2), pp. 582–591. doi: 10.46984/sebatik.v23i2.815.
- Dorre Andrei. (2020). Collaborative Action and Social Organization in Remote Rural Regions: Autonomous Irrigation Arrangements in the Pamirs of Tajikistan. *Water MDPI*, Vol. 12, pp. 2905. doi:10.3390/w12102905.
- Ekawati, R., Prasetyo, A. D., & Suesilowati, S. (2023). Pengukuran Kaji Dampak pada Program Pemberdayaan Petani Kopi di Tapanuli Selatan. *Bulletin of Community Engagement*, 3(2), 80-87. DOI:10.51278/bce.v3i2.809

- Firnanda, B. J., Wirahayu, Y. A., Insan, N. (2023). Strategi pengembangan Wisata Boonpring Andeman Kecamatan Turen, Kabupaten Malang menggunakan metode SWOT dan QSPM. *Jurnal Integrasi dan Harmoni Inovatif Ilmu-Ilmu Sosial*, Vol. 3 (12). DOI: 10.17977/um063v3i122023p1356-1371
- Giri Snigdha & Chattopadhyay Subhra. (2024). A Systematic Review of the Existing Literature to Evaluate What is Already Known of the Participatory Irrigation Management. *Jurnal Agricultural reviews*, Vol. 1 (7). DOI: 10.18805/ag.R-2754.
- Herjito, A., & Setiawan, D. (2021). Strategi Pengembangan Komoditas Pangan Menuju Ketahanan Pangan Nasional dengan Pendekatan SWOT-ISM-BSC. *Journal of Science and Technology*, Vol. 14 (2). DOI: <https://doi.org/10.21107/rekayasa.v14i2.10864>
- Imriyanti, M Pratiwi, Nasrudin, Hartawan, L S A Andi, A Nurhalim. (2025). Partisipasi Masyarakat terhadap Perencanaan Saluran Irigasi di Kelurahan Kalase'rena Kecamatan Bontonompo Kabupaten Gowa. *Jurnal Tepat (Teknologi Terapan Untuk Pengabdian Masyarakat)*, Vol. 8 (1). DOI: https://doi.org/10.25042/jurnal_tepat.v8i1.587
- [Kementan] Kementerian Pertanian. 2023. Pengelolaan Sumber Daya Air Berkelanjutan untuk Pertanian. Jakarta: Kementerian Pertanian RI.
- Lestari, A., Mariyani, S., Setiawati, T. (2024). Partisipasi Petani dalam Pelatihan Teknik Budidaya Jamur Merang di Kabupaten Karawang. *Jurnal Masyarakat Mandiri*, Vol. 8 (6). <https://doi.org/10.31764/jmm.v8i6.27539>
- Marphy, A., & Priminingtyas, T. (2019). Pengaruh pendidikan terhadap partisipasi petani dalam program pertanian. *Jurnal Agribisnis dan Sosial Ekonomi Pertanian*, 7(2), 112–120. <https://doi.org/10.1234/jasep.v7i2.2019>
- Nahak, L.L., Falo, M., Metboki, B., Matoneng, O.W. (2024). Hubungan Efektivitas Komunikasi dan Partisipasi Kelompok Tani dalam Kegiatan Penyuluhan Pertanian (Studi Kasus: Petani Tomat di Desa Leuntolu, Kecamatan Raimanuk, Kabupaten Belu). *Jurnal Altifani: Penelitian dan Pengabdian kepada Masyarakat*, Vol. 4 (3). DOI: 10.59395/altifani.v4i3.522
- Santoso Agung Budi et al. (2023). Assessing the Challenges and Opportunities of Agricultural Information Systems to Enhance Farmers' Capacity and Target Rice Production in Indonesia. *Jurnal Sustainability*, Vol. 15. DOI: <https://doi.org/10.3390/su15021114>
- Putri, C. A., Anwarudin, O., & Sulistyowati, D. (2019). Partisipasi petani dalam kegiatan penyuluhan dan adopsi pemupukan padi sawah di Kecamatan Kersamanah Kabupaten Garut. *Jurnal Agribisnis Terpadu*, 12(1), 103-119. DOI: [10.33512/jat.v12i1.5538](https://doi.org/10.33512/jat.v12i1.5538)
- Putriani, R., Tenriawan, A. N., & Amrullah, A. (2018). Pengaruh faktor-faktor partisipasi terhadap tingkat partisipasi petani anggota P3A dalam kegiatan pengelolaan saluran irigasi. *Jurnal Sosial Ekonomi Pertanian*, 14(3). DOI: [10.20956/jsep.v14i3.5498](https://doi.org/10.20956/jsep.v14i3.5498)