Jurnal Agrinika: Jurnal Agroteknologi dan Agribisnis
Volume 08, Issue 02 (2024)
E-ISSN: 2721-2807

Strategy for Implementing Climate Smart Agriculture Technology in Rice Farming in Karang Agung Ilir Subdistrict, Banyuasin Regency

Efraini[1], Yudhi Zuriah Wirya Purba[2*], Eka Thanomutiara[2], Arie Firmansyah[2]

[1]Department of Agriculture Food Crops and Horticulture, Sjakhyakirti University, South Sumatra, Indonesia

[2]Agribusiness Master Study Program, Sjakhyakirti University, South Sumatra, Indonesia

*Corresponding author: yudhi.wardi@yahoo.com

Keywords:
CSA;
Farmers;
Farming;
Rice;
Technology

Submited:
03-06-2024

Accepted:
18-09-2024

Published:
29-09-2024

ABSTRACT

The CSA approach is an approach to developing agricultural strategies to maintain sustainable food security in facing the impacts of climate change. This research aims to formulate strategies to implement Climate Smart Agriculture (CSA) technology in Karang Agung Ilir District, Banyuasin Regency. In this research, the method used is SWOT analysis. A tool that can be used to formulate a strategy is the SWOT matrix. This matrix will describe the strengths and weaknesses (internal) of farming businesses that apply CSA technology in Karang Agung Ilir District, Banyuasin Regency. This matrix can produce four sets of possible strategic alternatives, namely S-O Strategy, W-O Strategy, S-T Strategy and W-T Strategy. The research results using SWOT analysis have formulated a strategy based on internal and external factors as follows: (1) The strategy falls into quadrant I, indicating the presence of strengths and opportunities to support aggressive growth policies. This situation is highly favourable because some opportunities and advantages can be utilized: (2)Maximizing resources, facilities, and infrastructure, as well as government support, in implementing CSA technology; (3)Providing regular mentoring programs to farmers and extension services to enhance their knowledge and skills in implementing the CSA program; (4)Strengthening farmer institutions to provide them with accessibility to technological devices and continuous innovation information in the implementation of CSA technology.

1. Introduction

The agricultural sector plays an important role in the economy of most developing countries. This is clearly evident from the role the agricultural sector plays in supporting the population and providing employment opportunities (Ngadi *et al*., 2023). Agricultural development must receive better attention. The agricultural sector can generate a surplus, which can occur if productivity is increased, thereby resulting in higher incomes for farmers. (Wijaya & Astuti, 2023) Improving food production through intensification, extensification, and diversification of agriculture is expected to improve farmers' living standards and expand job opportunities for those who still depend on the agricultural sector (Cybex Pertanian, 2019).

SIMURP (Strategic Irrigation Modernization and Urgent Rehabilitation Project) is an urgent and important initiative focused on the modernization and rehabilitation of irrigation networks. The implementation of SIMURP involves multiple ministries under the coordination of the National Steering Committee on Water Resources (NSCWR)(Ariyanti, 2023). The NSCWR was established by a decree of the Minister of National Development Planning/Head of BAPPENAS, with members consisting of senior officials (echelon I) from BAPPENAS, the Ministry of Public Works and Housing, the Ministry of Home Affairs, the Ministry of Agriculture, the Ministry of Environment and Forestry, the Ministry of Marine Affairs and Fisheries, and the Ministry of Finance. In South Sumatra Province, the SIMURP activities are focused on Climate Smart Agriculture (CSA), which is integrated with the Irrigation Rehabilitation and Modernization activities by the Ministry of Public Works and Housing and the strengthening of irrigation management institutions by the Ministry of Home Affairs (BPPSDMP Ministry of Agriculture, 2023).

The focus of SIMURP activities is the government's strategic effort to anticipate the negative impacts of global climate change through the implementation of Climate Smart Agriculture (CSA) (Aisyah *et al*., 2023). There are three main targets in the implementation of CSA: (i) increasing cropping intensity, productivity, and income in the agricultural sector, (ii) adapting to and building resilience against the impacts of climate change (ICC), and (iii) as much as possible, reducing or eliminating greenhouse gas emissions. The implementation of CSA is an approach to developing agricultural strategies to ensure sustainable food security in the face of climate change impacts (BPPSDMP Ministry of Agriculture, 2023). In efforts to anticipate extreme climate change and the current global food crisis, the Climate Smart Agriculture (CSA) program is very important because it is an approach that transforms and reorients agricultural production systems and food value chains to support sustainable agriculture (Tilahun *et al*., 2023). Over time, CSA technology also aims to increase production, productivity, and the Cropping Index (CI), improve farmers' incomes, and reduce the effects of greenhouse gases (GHGs) (Khatri-Chhetri *et al*., 2017).

The success of increasing productivity and reducing greenhouse gas emissions can be achieved through various efforts to implement appropriate CSA technology packages, following the recommendations from the Agricultural Research and Development Agency, specifically Balingtan Pati (Wakweya, 2023). According to BPPSDMP Ministry of Agriculture (2023), the following are the CSA technology packages:

1. Water-saving technology through intermittent irrigation systems/Alternate Wet and Drying (AWD)/macak-macak,
2. Balanced fertilization using soil testing devices for paddy fields/swamps (PUTS/PUTR) to determine the appropriate doses of Nitrogen, Phosphorus, and Potassium (NPK) fertilizers or using fertilizer recommendations from the Agricultural Research and Development Agency,
3. Use of high-yielding varieties that are stress-tolerant and low-emission,
4. Use of organic materials to make organic fertilizers,
5. Rice cultivation system using the jajar legowo method with young seedlings and using 2-3 seedlings per hole,
6. Implementation of integrated pest management (IPM) prioritizing the use of botanical pesticides,
7. Use of planting calendars to determine planting times,
8. Measurement of greenhouse gas emissions.

Agriculture is a strategic development sector in South Sumatra Province due to the abundant agricultural resources in the region (Abbasi *et al*., 2022). This potential must be utilized and developed with appropriate technology to ensure food security for the people of

South Sumatra Province. South Sumatra is the fifth largest rice-producing region in Indonesia and the second largest outside Java after South Sulawesi in 2022 (Wieliczko & Floriańczyk, 2022). Banyuasin Regency, the rice granary of South Sumatra Province, has significant natural resources, especially extensive agricultural land. According to the Central Statistics Agency (BPS), the harvested rice area in Banyuasin Regency was 184,134.91 hectares in 2021, 177,999.40 hectares in 2022, and 177,444.28 hectares in 2023 (BPS, 2023). Banyuasin Regency needs appropriate technology to increase cropping intensity, productivity, and income in the agricultural sector while reducing or eliminating greenhouse gas emissions as much as possible. Therefore, innovations in technology are needed to improve both the quantity and quality of production to achieve the targets of the CSA technology implementation program.The number of rice farmers adopting CSA technology needs to increase, considering that one of the efforts towards rice self-sufficiency is cultivating rice using environmentally friendly technology, which is expected to yield high results in managed rice farming (Wakweya, 2023). In the field, achieving good production requires strategies to ensure the continuous application of technology, which can serve as a reference for farmers in implementing CSA technology (Mujeyi *et al*., 2020).

Karang Agung Ilir Subdistrict is one of the subdistricts in Banyuasin Regency, with significant potential in agriculture and a substantial number of farmers with extensive cultivated land. The number of farmer groups, farmers, and the area of cultivated land in Karang Agung Ilir Subdistrict can be seen in the following table 1.

Table 1. Distribution of Villages with Cultivated Land Area in Karang Agung Ilir Subdistrict, Banyuasin Regency, 2024

No.	Village	Total		Land Area (Ha)
		Number of Farmers Groups	Members/Farmers	
1.	Sumber Rejeki	30	727	1,450
2.	Sri Agung	29	608	1,000
3.	Mekar Sari	25	619	1,050
4.	Karang Sari	19	486	750
5.	Majuria	20	539	812
6.	Jati Sari	28	680	1,364
7.	Tabala Jaya	20	556	879
	Total	171	4.215	7,300

Source: Karang Agung Ilir Subdistrict Program, Banyuasin Regency, 2024

Karang Agung Ilir Subdistrict is the district implementing SIMURP activities in South Sumatra Province, where farmers have already adopted CSA technology. From Table 1, it can be observed that the land area in Karang Agung Ilir Subdistrict, Banyuasin Regency, is very extensive, with a total of 4,215 farmers. However, there is still a lack of awareness among farmers regarding the adoption of CSA technology. Appropriate strategies are crucial for stakeholders to encourage farmers to adopt CSA technology. Thus, the aim of the SIMURP Program with the implementation of CSA technology is to increase rice productivity and ultimately improve the welfare of farmers while reducing greenhouse gas emissions.

From the description above, there is still a lack of research related to CSA technology, and very few studies have been conducted on this topic. Therefore, the author feels compelled to conduct research to formulate strategies necessary for implementing CSA technology, especially in the Karang Agung Ilir Subdistrict of Banyuasin Regency.

2. Methodology

This research was conducted in the Karang Agung Ilir Subdistrict of Banyuasin Regency, South Sumatra Province that was intentionally determined (purposive) with the consideration that this subdistrict is a significant area for the SIMURP activities, where many farmers adopt Climate Smart Agriculture (CSA) technology (Prashanthi *et al*., 2022). The method used in this research was a survey. The population taken in this study consisted of farmers who adopted CSA technology and farmers who adopted non-CSA technology in the Karang Agung Ilir Subdistrict, totalling 402 farmers scaling up as the population applying CSA technology. The sampling method used was proportionate stratified random sampling, wherein each unit in the population had an equal chance of being selected. The sample size was 80 sample farmers, with 40 sample farmers using CSA technology and 40 sample farmers using non-CSA technology.

The data sources obtained in this research include primary data and secondary data. Primary data were obtained through direct field observations and interviews with respondents, namely rice farmers who adopt CSA technology and those who adopt non-CSA technology. Secondary data are further processed data obtained from relevant institutions such as the Central Statistics Agency (BPS), the Department of Food Crops and Horticulture of South Sumatra Province, the Department of Agriculture of Banyuasin Regency, the Internet, relevant literature such as journals, textbooks, magazines, newspapers, as well as previous research that can be used as reference materials related to this study.

To address the research objective concerning the appropriate strategy in implementing CSA (Community Supported Agriculture) technology, a descriptive explanation will be provided using the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis method, along with depicting a SWOT matrix (Benzaghta *et al*., 2021). This will reveal the strengths and weaknesses (internal) as well as the external factors of the farming enterprise implementing CSA technology. This matrix can generate four sets of possible strategic alternatives: S-O Strategy, W-O Strategy, S-T Strategy, and W-T Strategy(Mashuri & Nurjannah, 2020).

3. Results and Discussion

The data obtained from the field will be grouped through tabulation, and the results of this data analysis will be systematically interpreted. Subsequently, a descriptive, structured, and systematic discussion will follow. The findings of the analysis and discussions will ultimately be used to formulate recommendations for the implementation of CSA technology in the Karang Agung Ilir District of Banyuasin Regency. the SWOT analysis is divided into four main quadrants, each with different strategies for its respective quadrant(Astuti & Ratnawati, 2020). The diagram of the SWOT analysis quadrants and their explanations are as follows:

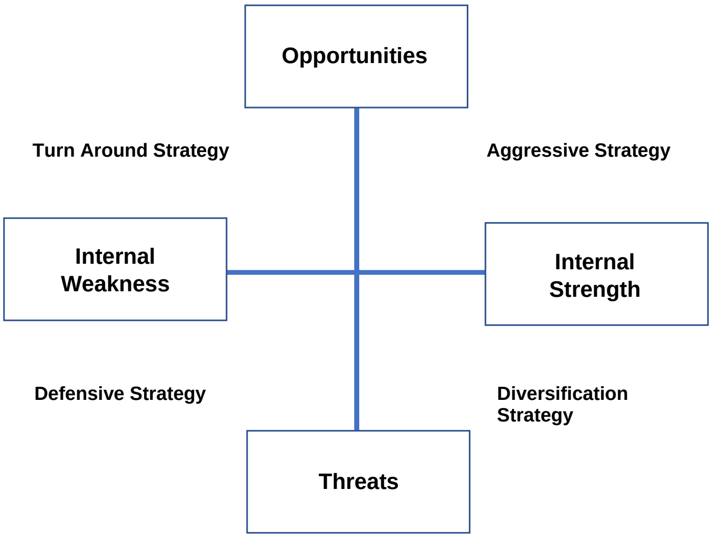

Figure 1. SWOT Analysis Quadrants in CSA Technology Implementation

From Figure 1, it can be observed that the SWOT analysis is divided into the following quadrants:

- **Quadrant 1**. Represents a highly advantageous situation because it possesses opportunities and strengths, allowing for the exploitation of existing opportunities. The strategy to be implemented in this condition is to support aggressive growth-oriented policies.
- **Quadrant 2**. Despite facing various threats, it still retains internal strengths. The strategy to be applied is to utilize strengths to capitalize on long-term opportunities through diversification strategies (product/market).
- **Quadrant 3**. Faces significant opportunities but concurrently encounters several internal constraints/weaknesses. The situation in quadrant 3 is similar to a question mark in the BCG matrix. The strategic focus is on minimizing internal problems to seize favorable opportunities.
- **Quadrant 4**. Represents a highly unfavorable situation, encountering various threats and internal weaknesses.

To create a plan, it is essential to evaluate both external and internal factors. The analysis of these factors should yield an understanding of an organization's strengths and identify its weaknesses. Meanwhile, the analysis of external factors should identify opportunities available to the organization as well as the threats it faces.

The analysis method is used to determine the variables that fall into the categories of strengths, weaknesses, opportunities, and threats (SWOT) that an entity possesses (Permaisela, 2019). In formulating strategies, one can refer to the Internal Factor Analysis Summary (IFAS) scores, which analyze the strengths and weaknesses of the company, and the External Factor Analysis Summary (EFAS) scores, which comprise opportunities and threats(Kurniawan & Abidin, 2020). By employing systematic thinking and comprehensive diagnostic results, all factors are extensively utilized in strategic planning, wherein the influences of operational environmental factors are deeply and broadly analyzed. Here is the breakdown of internal and external environmental factors:

1. Internal Strength Factors:
   a) Farmers' adherence to traditional cultivation methods or conventional farming practices inherited from ancestors.
   b) Farmers' experience in agriculture.
   c) Suitability of the land conditions at the research location.
   d) Land area owned by farmers.
2. Internal Weakness Factors:
   a) Farmers' level of education.
   b) Farmers' adoption rates.
   c) Age of farmers.
3. External Opportunity Factors:
   a) Availability of internet access.
   b) Qualifications and number of rural workforce/extension workers.
   c) Intensity of extension services.
   d) Government support.
   e) Transportation facilities.
4. External Threat Factors:
   a) Investment costs.
   b) Accessibility and supportive technological devices (characteristics of technology that can facilitate data collection and analysis)

The next step after analying the internal and external factors is to assign weights to each value associated with strengths, weaknesses, opportunities, and threats (Affandy, 2022). Weights are assigned to each factor variable ranging from 1.0 (very important) to 0.0 (not important). The total of all these weights should not exceed 1.0. Factors with the most significant impact will be given the highest weights. Subsequently, the weighted score calculation is conducted, which involves multiplying the total weights of each factor, both internal and external, by the ratings obtained to determine the score for each factor. The calculation of weights for IFAS variables can be seen in Table 2.

Table 2. Internal Factors Analysis Summary (IFAS) Matrix in Karang Agung Ilir District, Banyuasin Regency, 2024

No	Strategic Factors	Rating (R)	Weight (W)	Total Score (R x W)
A	Strengths			
	1. Farmers' habit of applying ancestral cultivation patterns or conventional methods	4	0,19	0,76
	2. Farmers' experience in agriculture	4	0,20	0,80
	3. Suitability with the land conditions at the research location	4	0,20	0,80
	4. Size of the farmers' land	3	0,14	0,42
Total				2,78
B	Weaknesses			
	1. Farmers' education level	1	0,06	0,18
	2. Farmers' adoption rate	2	0,11	0,22
	3. Farmers' age	2	0,11	0,22
Total				0,50
Total A+B				3,28

Source: Primary Data Processing Results, 2024

In Table 3, you can see the calculation of weights for EFAS variables for opportunities and threats

Table 3. External Factors Analysis Summary (EFAS) Matrix in Karang Agung Ilir District, Banyuasin Regency, 2024

No	Strategic Factors	Rating (R)	Weight (W)	Total Score (R x W)
A	Opportunities			
	1. Availability of internet access	3	0,15	0,45
	2. Qualifications and number of rural workers/extension workers	3	0,15	0,45
	3. Intensity of extension services	3	0,15	0,45
	4. Government support	4	0,20	0,80
	5. Transportation facilities	3	0,15	0,45
	Total A			2,60
B	Threats			
	1. Investment costs	2	0,10	0,20
	2. Accessibility and supporting technology (technology characteristics that can facilitate data collection and analysis)	2	0,10	0,20
	Total B			0,40
Total A+B				3,00

Source: Primary Data Processing Results, 2024

Next, the scores from the internal and external factors are matched to the quadrants of the SWOT Analysis. This is done to determine the business's current position and decide on the focus strategy to be used later(Rizki *et al*., 2021). The total weighted score indicates the level of importance of internal and external environmental factors in policy development in formulating recommendations for the implementation of CSA technology in the Karang Agung Ilir District of Banyuasin Regency.

The X-axis represents internal factors, while the Y-axis represents external factors. By calculating the matrix values in Tables (2 and 3), the quadrant matrix values are obtained. For the X value, it is the difference between the total strengths and total weaknesses(Krisdayani *et al*., 2020). For the Y value, it is the difference between the total opportunities and total threats(Astuti & Ratnawati, 2020). Here are the detailed results of the matrix values for X and Y. The magnitude of the X value is as follows:

$$X = \sum S - \sum W$$
$$X = 2{,}78 - 0{,}50$$
$$X = 2{,}28$$

Meanwhile, the Y values are as follows:

$$Y = \sum O - \sum T$$
$$Y = 2{,}60 - 0{,}40$$
$$Y = 2{,}20$$

After obtaining the calculations for the X and Y values, the SWOT diagram can be depicted. Below is Figure 2, which represents the SWOT analysis quadrants. Based on the scores obtained through the analysis of IFAS and EFAS matrices, whether they are opportunities (+) or threats (-) and whether strengths (+) outweigh weaknesses (-) can be seen in the SWOT analysis quadrants in Figure 2.

Based on Figure 2, it shows that the strategy falls into quadrant I (positive, positive). This position indicates having strengths and opportunities, enabling the exploitation of available opportunities. The strategy to be established in this quadrant is to support aggressive growth policies because being in quadrant I indicate a highly favorable situation due to the presence of opportunities and strengths, allowing for the utilization of the existing conditions.

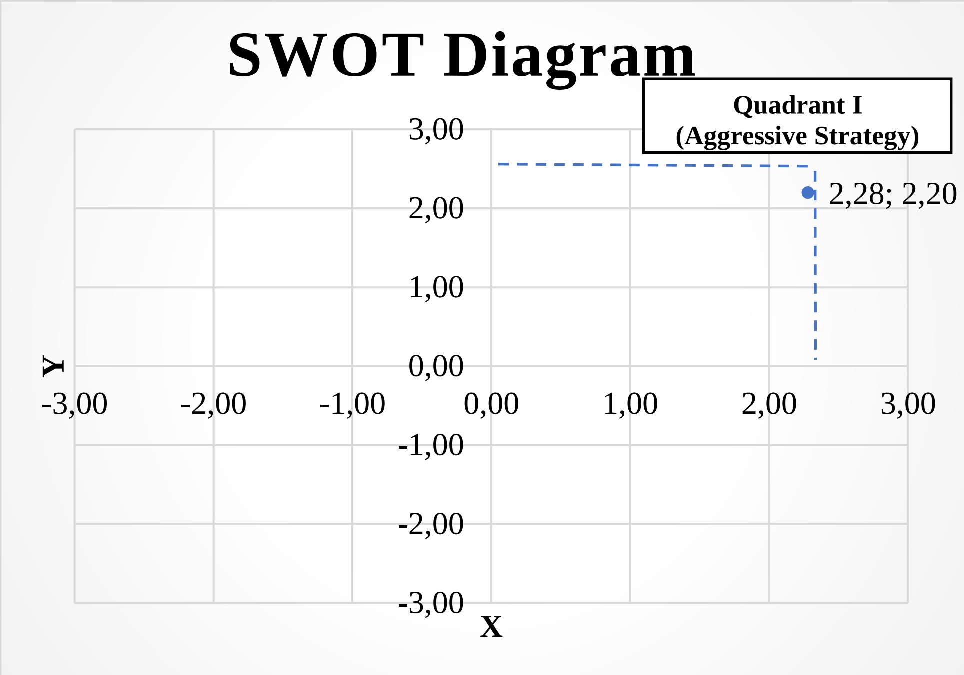

Figure 2. SWOT Matrix Analysis Quadrants

SWOT analysis is an alternative strategy for developing a policy to be implemented in a particular area. To create a plan, it's essential to evaluate both external and internal factors. The analysis of these factors should result in identifying the strengths possessed by an organization and understanding the weaknesses it has. Meanwhile, the analysis of external factors should identify opportunities available to the organization and also recognize the threats it faces(Vlados, 2019). According to (Affandy, 2022), SWOT analysis is a logic-based analysis that aims to maximize strengths and opportunities while simultaneously minimizing weaknesses and threats. SWOT analysis evaluates the interaction between external factors (opportunities and threats) and internal factors (strengths and weaknesses).

Based on Table 4, alternative strategies using SWOT analysis can be outlined as follows:

1. Strategy SO (Strength-Opportunity). The alternative strategies formulated under SO are:
   a) Maximizing resources, facilities, and infrastructure.
   b) Enhancing institutional roles to provide clear and continuous information about innovations in the CSA program.
   c) Sustaining the intensity of extension services.
   d) Maximizing land and government support in the CSA program.

Table 4. SWOT Matrix of AEC Optimization Strategy

EFE / IFE	*Strength* (S) a. Farmers' habit of applying ancestral cultivation patterns or conventional methods b. Farmers' experience in agriculture c. Suitability with the land conditions at the research location d. Size of the farmers' land	*Weakness* (W) a. Farmers' education level b. Farmers' adoption rate c. Farmers' age
Opportunities (O) a. Availability of internet access b. Qualifications and number of rural workers/extension workers c. Intensity of extension services d. Government support e. Transportation facilities	Strategies (SO) 1. Optimize resources, facilities, and infrastructure 2. Optimize the role of institutions to provide clear and continuous information on innovations in the CSA program 3. Maintain the intensity of extension services 4. Maximize land and government support in the CSA program	Strategies (WO) 1. Provide regular mentoring programs to farmers and extension services to enhance farmers' knowledge and skills in the CSA program 2. Encourage farmers to use CSA technology 3. Improve the quality of human resources by utilizing extension workers and related stakeholders 4. Increase community participation to support the farmer card program
Threats (T) a. Investment costs b. Accessibility and supporting technology (technology characteristics that can facilitate data collection and analysis)	Strategies (ST) 1. Develop human resource skills to increase productivity 2. Provide extension services accompanied by demonstrations so farmers can directly see the results of the introduced innovations 3. Develop subsidized fertilizer products for the lower-middle segment	Strategies (WT) 1. Strengthen farmer institutions so that farmers have access to technology devices 2. Improve the quality of information delivery methods regarding the CSA technology program 3. Increase cost efficiency by approaching farmers with innovative facilities and infrastructure

2. Strategy WO (Weakness-Opportunity). The alternative strategies formulated include:
    a) Providing regular mentoring programs to farmers and extension services to enhance their knowledge and skills in implementing the CSA program.
    b) Encouraging farmers to adopt CSA technology.

c) Improving human resource quality by utilizing extension workers and relevant stakeholders.
d) Enhancing community participation to support the program.
3. Strategy ST (Strength-Threat). Alternative strategies formulated include:
a) Developing human resource skills to increase productivity.
b) Providing extension services accompanied by demonstrations so that farmers can directly observe the results of the introduced innovations.
c) Developing subsidized fertilizer products for the lower to middle-income segments.
4. Strategy WT (Weakness-Threat). Alternative strategies formulated include:
a) Strengthening farmer institutions to provide them with accessibility to technological devices.
b) Improving the quality of information delivery about the CSA technology program.
c) Increasing cost efficiency by approaching innovative infrastructure to farmers.

.

4. Conclusion

The research results using SWOT analysis have formulated a strategy based on internal and external factors as follows:

1. The strategy falls into quadrant I, indicating the presence of strengths and opportunities to support aggressive growth policies. This situation is highly favorable because some opportunities and advantages can be utilized.
2. Maximizing resources, facilities, and infrastructure, as well as government support, in implementing CSA technology.
3. Providing regular mentoring programs to farmers and extension services to enhance their knowledge and skills in implementing the CSA program.
4. Strengthening farmer institutions to provide them with accessibility to technological devices and continuous innovation information in the implementation of CSA technology.

References

Abbasi, R., Martinez, P., & Ahmad, R. (2022). The digitization of agricultural industry – a systematic literature review on agriculture 4.0. In *Smart Agricultural Technology*. https://doi.org/10.1016/j.atech.2022.100042

Affandy, S. (2022). Impementasi Analisis SWOT (Strenght, Weakness, Opportunity, Threat) pada Organisasi Dakwah. *INTELEKSIA - Jurnal Pengembangan Ilmu Dakwah*. https://doi.org/10.55372/inteleksiajpid.v4i1.241

Aisyah, S., Faqih, A., Komala, R., Aini, N., Dewi, R. M., & Alamsyah, R. (2023). Field Agricultural Extension Workers' Influence as Mediators on The Success of Strategic Irrigation Modernization and Urgent Rehabilitation Project (SIMURP) program. *Devotion : Journal of Research and Community Service*. https://doi.org/10.59188/devotion.v4i7.511

Ariyanti, V. (2023). A readiness assessment of an Indonesian pilot project: Case study Kedungputri, a premium irrigation area, Central Java. *Irrigation and Drainage*. https://doi.org/10.1002/ird.2796

Astuti, A. M. I., & Ratnawati, S. (2020). Analisis SWOT Dalam Menentukan Strategi Pemasaran (Studi Kasus di Kantor Pos Kota Magelang 56100). *Jurnal Ilmu Manajemen*.

Benzaghta, M. A., Elwalda, A., Mousa, M., Erkan, I., & Rahman, M. (2021). SWOT analysis applications: An integrative literature review. *Journal of Global Business Insights*. https://doi.org/10.5038/2640-6489.6.1.1148

Cybex Pertanian. (2019). *Budidaya Tanaman Padi*. Cybex Pertanian.

Khatri-Chhetri, A., Aggarwal, P. K., Joshi, P. K., & Vyas, S. (2017). Farmers' prioritization of climate-smart agriculture (CSA) technologies. *Agricultural Systems*. https://doi.org/10.1016/j.agsy.2016.10.005

Krisdayani, M., Ihsan Said Ahmad, M., & Rijal, S. (2020). Analisis Strategi Pengembangan Usaha Ekonomi Kreatif (Studi Kasus Pada Sentra Kerajinan Tangan Anjoroku di Kabupaten Kepulauan Selayar). *Indonesian Journal of Social and Educational Studies*.

Kurniawan, D. A., & Abidin, M. Z. (2020). Strategi Pengembangan Wisata Kampoeng Durian Desa Ngrogung Kecamatan Ngebel Ponorogo melalui Analisis Matrik IFAS dan EFAS. *Al Tijarah*. https://doi.org/10.21111/tijarah.v5i2.3706

Mashuri, M., & Nurjannah, D. (2020). Analisis SWOT Sebagai Strategi Meningkatkan Daya Saing. *JPS (Jurnal Perbankan Syariah)*. https://doi.org/10.46367/jps.v1i1.205

Mujeyi, A., Mudhara, M., & Mutenje, M. J. (2020). Adoption determinants of multiple climate smart agricultural technologies in Zimbabwe: Considerations for scaling-up and out. *African Journal of Science, Technology, Innovation and Development*. https://doi.org/10.1080/20421338.2019.1694780

Ngadi, N., Zaelany, A. A., Latifa, A., Harfina, D., Asiati, D., Setiawan, B., Ibnu, F., Triyono, T., & Rajagukguk, Z. (2023). Challenge of Agriculture Development in Indonesia: Rural Youth Mobility and Aging Workers in Agriculture Sector. *Sustainability (Switzerland)*. https://doi.org/10.3390/su15020922

Permaisela, D. (2019). ANALYSIS OF PRODUCTIVE WAQF PRACTICE AND MANAGEMENT: USING SWOT ANALYSIS METHOD. *Al-Uqud : Journal of Islamic Economics*. https://doi.org/10.26740/al-uqud.v3n1.p85-97

Prashanthi, S., Asokhan, M., Janakirani, A., & Patil, S. G. (2022). Constraints for Adoption of CSA Technologies and the Suggested Measures. *Asian Journal of Agricultural Extension, Economics & Sociology*. https://doi.org/10.9734/ajaees/2022/v40i931024

Rizki, M., Ghifari, A., Hui, W. L., Permata, E. G., Siregar, M. D., Umam, M. I. H., & Harpito. (2021). DETERMINING MARKETING STRATEGY AT LPP TVRI RIAU USING SWOT ANALYSIS METHOD. *Journal of Applied Engineering and Technological Science*. https://doi.org/10.37385/jaets.v3i1.276

Tilahun, G., Bantider, A., & Yayeh, D. (2023). Synergies and trade-offs of climate-smart agriculture (CSA) practices selected by smallholder farmers in Geshy watershed, Southwest Ethiopia. *Regional Sustainability*. https://doi.org/10.1016/j.regsus.2023.04.001

Vlados, C. (2019). On a correlative and evolutionary SWOT analysis. *Journal of Strategy and Management*. https://doi.org/10.1108/JSMA-02-2019-0026

Wakweya, R. B. (2023). Challenges and prospects of adopting climate-smart agricultural practices and technologies: Implications for food security. In *Journal of Agriculture and Food Research*. https://doi.org/10.1016/j.jafr.2023.100698

Wieliczko, B., & Floriańczyk, Z. (2022). Priorities for Research on Sustainable Agriculture: The Case of Poland. *Energies*. https://doi.org/10.3390/en15010257

Wijaya, W., & Astuti, L. C. (2023). Kajian Literatur Hubungan Karakteristik Petani dengan Adopsi Inovasi Budidaya Padi Sawah. *Paradigma Agribisnis*. https://doi.org/10.33603/jpa.v5i2.7833