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The Role of Stakeholders in Achieving Sustainable Agriculture: A Case Study in Sragen Regency, Indonesia

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ABSTRACT

Rice farming plays a crucial role in maintaining national resilience and stability. However, its sustainability is faced with complex and multidimensional challenges. One of the challenges agricultural sustainability faces is the reduction of farmland due to the construction of toll roads. The development of the Solo-Mantingan-Ngawi toll road has significantly impacted the reduction of agricultural land in Sragen Regency, the second-largest rice-producing area in Central Java after Grobogan. This issue will threaten national food security if left unaddressed without further intervention. The development of sustainable agriculture is expected to be a solution to promoting food resilience. However, stakeholder involvement is necessary for successful development. This research aims to identify the stakeholders involved in developing sustainable agriculture to promote food resilience in Sragen Regency. This study adopts a mixed-method approach with data collection through in-depth interviews. The analytical tool used in this research is MACTOR (Matrix of Alliance and Conflict: Tactic, Objectives, and Recommendation). The study identified the stakeholders influencing the development of sustainable agriculture in Sragen Regency as Farmer Groups, Farmers, Village Heads, Agriculture Extenders, and the Department of Agriculture and Food Security. These findings serve as a basis for developing collaborative patterns among all stakeholders required to develop sustainable agriculture to achieve food resilience in the Sragen Regency.

INTRODUCTION

Infrastructure development plays a vital role in fulfilling people's rights. It influences increasing community access and the productivity of existing resources to encourage economic growth (Ardiyono et al. 2018). Development in infrastructure aspects that require more space or large land is the construction of toll roads. The structure of toll roads cannot be separated from society's physical and non-physical aspects. The physical part is related to the environment, while the non-physical element is a social problem for the community. Of course, these two aspects are felt directly by the people affected by the toll road construction (Siswoyo 2020).

Although the construction of toll roads provides many benefits, such as accelerating the movement of people and goods, increasing accessibility to certain areas, and boosting the economy, there are also negative impacts (Dwiputri et al. 2022). One negative impact was a change in land use around the toll road construction area. The construction of toll roads requires quite a large area of land. It is usually carried out in areas with high economic value, such as agricultural land (Salim & Faoziyah, 2022). Construction of toll roads can change the land use from agriculture to non-agriculture, thereby reducing the available agricultural land and disrupting the sustainability of agricultural production in the area (Makbul et al. 2019). In addition, agricultural land is divided into 2 (two) parts because the construction of a toll road separates it. It is a constraint for farmers regarding irrigation. The impact is on the economic rights of the community related to their rights as citizens to obtain prosperity from the state as follows: the amount of income from agriculture has decreased because the land used for agricultural activities is decreasing. Value and compensation process (Sudiyarto & Indah 2019).

Meanwhile, human life is inseparable from the need for food, so food matters is an essential need for humans. Food is everything that comes from biological and water sources, both processed and unprocessed, which is intended as food or drink for human consumption, including food additives, food raw materials, and other materials used in the process of preparing, processing, and manufacturing food or beverages (FAO et al. 2021). The United Nations (UN) noted that at the end of 2018, there were still more than 821 million people worldwide, or one in nine people suffering from hunger (Kılıç

2022). The Asian Development Bank (2019) records that as many as 22 million people in Indonesia experience chronic hunger, which means the hunger level is still relatively serious. This issue is a challenge for stakeholders to achieve the zero hunger target by 2030 as the second goal of the SDGs (Sustainable Development Goals) (Manurung et al. 2022).

The issue of food security arises because of the problem of food insecurity, where this food insecurity is impacted due to reduced agricultural land. The land is one of the most important aspects of life. In agricultural production, the role of land as the primary input is irreplaceable. Economically, land is the most efficient wealth-generating asset for farmers (Muyanga et al. 2013, Sitko & Jayne 2014) and an essential factor for economic growth (Li 2014). However, the finite and non-renewable nature of land supply creates fierce competition for land use, usually between the agricultural and non-agricultural sectors. It has given rise to land use change, which has significantly increased from year to year. If this situation continues, it is feared that it could threaten food security in Indonesia. Central Java Province is a province on the island of Java that functions as a national food buffer zone (BPS 2022). One of the areas in Central Java Province that are experiencing the problem of reduced paddy fields is Sragen Regency. Sragen Regency is one of the potential areas and the second largest rice producer in Central Java after Grobogan (Prihartini et al. 2018, Anggraini et al. 2021). Rice production in the five highest districts in Central Java Province can be seen in Table 1.

Rice production in Sragen Regency in 2020 has decreased from the previous year to 723,671.68 tons. This situation is due to reduced agricultural land due to the Solo-Mantingan-Ngawi toll road construction project (Anggraini et al. 2021). If thousands of hectares of agricultural land, especially paddy fields in Sragen Regency, are converted into business and residential areas and offices, production in the farm rice sector will undoubtedly decrease. On the other hand, as a national rice storage area, paddy fields in the Sragen Regency should be maintained to fulfill national food needs and create food security. Sustainable agricultural development is needed to realize food security and sovereignty.

Table 1: The highest rice production in the five districts of Central Java Province in 2019.

No	Regency	Rice Production (Tonnnes)
1.	Grobogan	772521.47
2.	Sragen	766012.30
3.	Cilacap	699964.69
4.	Demak	666141.30
5.	Pati	592099.74

Source: Anggraini et al. (2021)

The 1990 US Livestock Bill, as discussed in Velten et al. (2015), defines sustainable agriculture as a holistic approach that encompasses various plant and animal production practices tailored to specific locations. Its long-term objectives include meeting human food and fiber needs, enhancing environmental quality, optimizing resource utilization, incorporating natural biological cycles and controls, ensuring the economic viability of agricultural operations, and improving the overall well-being of farmers and society. Sustainable farming systems strive to minimize environmental impact, maintain agricultural productivity, increase farmers' income, and enhance rural areas' stability and quality of life. However, achieving sustainable agricultural development and improving food security requires the involvement of multiple stakeholders.

The involvement of stakeholders is crucial as an essential aspect in decision-making and development planning because stakeholders are parties that influence or are influenced by those plans. The challenges in sustainable agriculture development can be overcome through collaborative and integrated development with the support and participation of all stakeholder actors within a mutually beneficial partnership framework. This aligns with Velten et al. (2021), who state that collaboration among stakeholders is crucial for the success of sustainable agriculture. Therefore, an analysis of stakeholder roles is necessary to understand their strengths, competitiveness, and attitudes toward the intended goals of this development project. The results of this stakeholder analysis are useful in determining the power map, support, and potential conflicts that may arise. Stakeholder support is vital for sustainable agriculture development (Syahyuti et al. 2021).

The idea of stakeholder involvement in the agricultural sector has grown due to the belief that such involvement can generate positive impacts on sustainable agriculture and support participation, empowerment, and inclusive stakeholder engagement (Adil et al. 2022). Based on the background of these issues, this research is designed to identify the stakeholders involved in developing sustainable agriculture in Sragen Regency, Indonesia. The findings of this research will be highly valuable in determining appropriate programs and action plans related to stakeholder engagement in developing the agricultural potential of Sragen Regency in a participatory and sustainable manner.

MATERIALS AND METHODS

Method of Collecting Data

This research uses a mixed method paradigm that combines qualitative and quantitative approaches in all stages of

the research process to obtain a holistic picture of the characteristics of stakeholders in the agricultural sector, especially in the Sragen Regency, about other stakeholders. The research location is in Sragen Regency, especially in the areas most affected by the construction of the Solo-Mantingan-Ngawi toll road, namely Jetak Village, Singopadu Village, Purwosuman Village, Karangmalang Village, and Kebonromo Village. The primary data collected consists of qualitative data from 26 informants, including the Head of the Department of Food Security in Sragen Regency, Village Heads, Agricultural Extenders, Farmer Groups, and Farmers. This study uses data collection techniques in in-depth interviews to strengthen the analysis and discussion. In-depth interviews were conducted with key informants who were determined purposively based on the informants' involvement and understanding of sustainable agriculture. Interviews were conducted by visiting the location of the informant. The consultation asked about the informant's knowledge of agricultural potential in Sragen Regency and the problems that arise.

Data Analysis Method

All data in this study were analyzed using Mactor software (Matrix of Alliances and Conflicts Tactics, Objectives, and Recommendations). Mactor is a software developed by Michel Godet in 1991 to deeply analyze power relations between actors, actors' competitiveness, and actors' attitudes towards goals. Mactor's work is based on inter-actor influence, distinguished as direct, indirect, and potential. Direct influence occurs when actor A affects actor B. In contrast, indirect influence occurs when actor A influences actor B and B affects actor C. With the transitivity process, actor C is indirectly influenced by A. Potential influence occurs when influence should have had actor A to B. Mactor works based on a structural analysis approach (Isa 2021).

The initial stages in Mactor's analysis are 1) determining system actors, 2) determining a set of goals, and 3) building a matrix of direct influence or MDI (Matrix of Direct Influence) and MAO (Matrix of Actor Objective). The MDI matrix describes the influence between actors on other actors, which is indicated by a score of 0 to 4. The greater the value suggests, the more significant the influence, while the MAO matrix shows the actor's attitude toward goals. The actor's attitude and judgment reflect the actor's role toward this goal on whether to support or reject the plan. This matrix is filled with a value of 0 (the goal has a dismal outcome), 1 (pursuit interferes with the actor's operational procedures), 2 (plan interferes with the success of the actor's work), 3 (goal interferes with the achievement of the actor's mission, and 4 (pursuit interferes with the actor's existence)

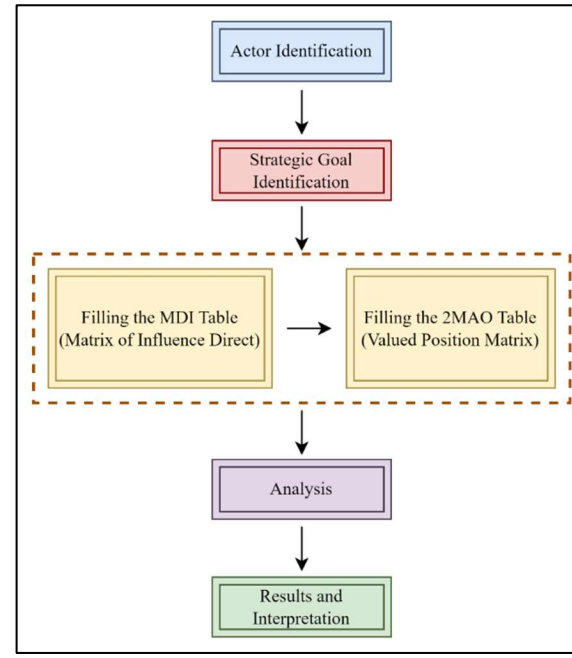

Fig. 1: The stages of Mactor analysis.

(Gravitiani et al. 2022). The stages of MACTOR analysis are summarized in Fig. 1.

RESULTS AND DISCUSSION

The initial step in MACTOR analysis is to identify key actors and determine their objectives in the effort to develop sustainable agriculture in the Sragen Regency. Based on preliminary observations, several actors have shown their interest in sustainable agriculture development in Sragen Regency, as described in Table 2. In addition, several objectives were also identified which were grouped in Table 3.

In the next stage, the positioning of the actors involved in sustainable agricultural development in the region is mapped. The position of each actor is assessed based on their level of influence and dependency on other actors. The results obtained from questionnaires and in-depth interviews

Table 2: Identification of actors/stakeholders related to sustainable agriculture development in Sragen Regency.

No	Actor/Stakeholder	Code
1.	Department of Agriculture and Food Security	DAFS
2.	Village Heads	VH
3.	Farmer Groups	FG
4.	Agriculture Extenders	AE
5.	Farmers	FAR

Table 3: Identification of objectives related to sustainable agriculture development in Sragen Regency.

No	Objectives	Code
1.	The Application of an Environmentally Friendly Rice Farming System	Farming
2.	An increase in Farmers' Access to Finance	Finance
3.	Providing Subsidies and Incentives to Farmers	Subsidies
4.	An increase in Farmers' Income	Income
5.	Increase the Availability of Agricultural Facilities and Infrastructure	Facilities
6.	Build Rice Supply Connectivity Between Regions	Supply

with the actors are entered into a Matrix of Direct Influence (MDI) in Table 4 and a Matrix of Valued Position (2MAO) in Table 5. Both matrices serve as inputs for the overall MACTOR analysis. Table 4 (MDI) provides an overview of the level of influence of each actor on others, while Table 5 (2MAO) illustrates the position of each actor in relation to the objectives of this development.

Mactor provides various tools and analyses helpful in getting a comprehensive and aggregate picture of a situation from a few simple inputs to the actor's role in problem-solving. Actors are essential in determining the strategy for formulating sustainable agricultural development policies, especially in the Sragen Regency. Stakeholder analysis is vital in mapping the roles and relationships between actors/stakeholders and understanding how stakeholders behave towards various sustainable agricultural development goals in the Sragen Regency. The first result of Mactor's analysis is a map of actor influence and dependency. Actor influence describes the actor's ability to influence other actors and design, plan, and implement the development of a project. The sources of the power of actor influence are determined by the ownership of material resources, social position, and the actors' knowledge of the future of a system (Tronvoll 2017). Based on their strength, actors are positioned in the actor's influence and dependency map. They are divided into dominant actors (strong influence), dominated actors (high dependency), isolated actors (low power and dependency), and relay actors (strong influence and dependency) (Elmsalmi & Hachicha 2014). The map of the impact and dependence of agricultural stakeholder actors in Sragen Regency is shown in Fig. 2.

Fig. 2 shows that the Farmer Group (FG), Farmer (FAR), and Village Head (VH) are the dominant actors, namely the most influential actors because the power to influence other actors is high while their dependency is low. This position is

Table 4: Direct influence between actors (MDI).

	Department of Agriculture and Food Security (DAFS)	Village Head (VH)	Farmer Group (FG)	Agriculture Extender (AE)	Farmer (FAR)
Department of Agriculture and Food Security (DAFS)	0	3	2	1	2
Village Head (VH)	4	0	4	3	2
Farmer Group (FG)	2	4	0	3	4
Agriculture Extender (AE)	3	2	2	0	2
Farmer (FAR)	4	3	3	4	0

Source: Primary Data Analysis, 2022.

Table 5: Attitudes of actors towards goals (2MAO).

	The Application of an Environmentally Friendly Rice Farming System (Farming)	An increase in Farmers' Access to Finance (Finance)	Providing Subsidies and Incentives to Farmers (Subsidies)	An increase in Farmers' Income (Income)	Increase the Availability of Agricultural Facilities and Infrastructure (Facilities)	Build Rice Supply Connectivity Between Regions (Supply)
Department of Agriculture and Food Security (DAFS)	3	4	3	2	2	4
Village Head (VH)	4	3	4	1	4	4
Farmer Group (FG)	2	3	4	3	4	4
Agriculture Extender (AE)	2	3	4	3	4	4
Farmer (FAR)	3	3	3	3	2	4

Source: Primary Data Analysis, 2022.

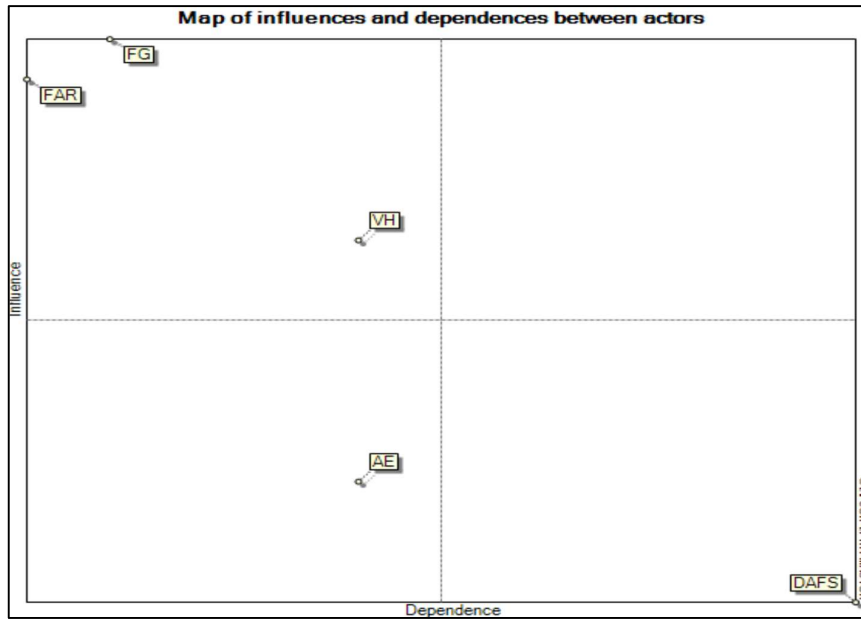

Fig. 2: Actor influence and dependence map.

controlled by the roles of these three actors, which are very important in the development of sustainable agriculture, as stated in the table. The dominant part of the three actors also shows their ability as leaders in determining future sustainable agricultural development policies. Agriculture Extender (AE) is an isolated actor because it has low influence and dependency. At the same time, the Department of Agriculture and Food Security (DAFS) is a dominant actor who is highly influenced and dependent on other actors.

The second result of Mactor's analysis is a map of actor competitiveness. Actor competitiveness describes the intensity of an actor's influence on other actors, which is determined by direct effect, direct dependence, indirect impact, and indirect dependence. The competitiveness map simultaneously shows the actors' willingness to use their power to control other actors (Elmsalmi & Hachicha 2014). Fig. 3 shows that Farmer Group and Farmer are actors who have the highest competitiveness. This mapping is exact because the Farmer Group is a group that has the most authority and responsibility for sustainable agricultural development.

In contrast, Farmers are a source of ideas and strength in sustainable agricultural development. With this great competitiveness, these two actors have enormous potential in determining sustainable agricultural development plans. In addition, the Department of Agriculture and Food Security is the actor with the weakest competitiveness. At the same time, other actors are in a moderate position.

The following analysis is related to the development objective map. One that determines stakeholder support or

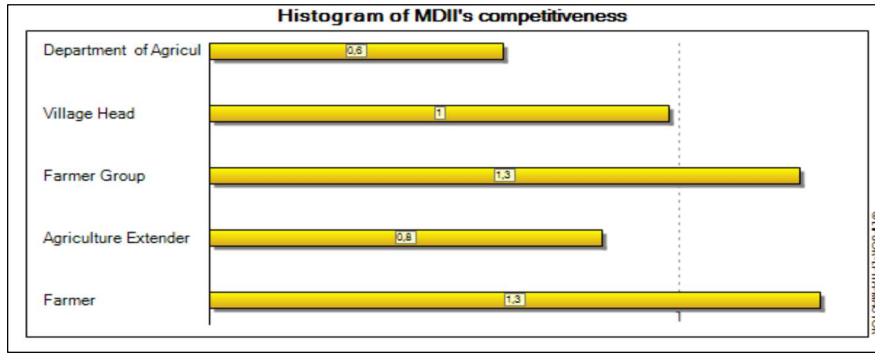

Fig. 3: Actor competitiveness.

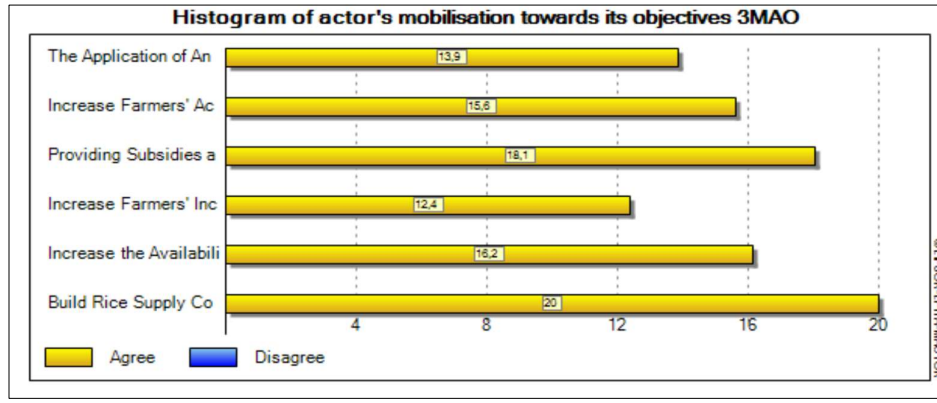

Fig. 4: Objective strength map.

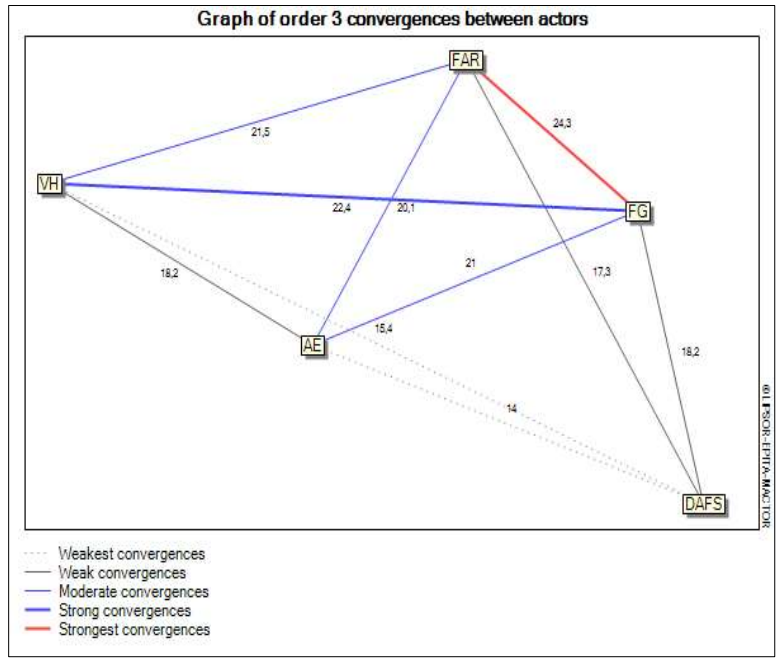

Fig. 5: Actor convergence map.

resistance in development is how appropriate the goals of the plot are to the actor's mission (Fuentes 2013). To find out the actor's support map for development goals, a group of goals to be achieved is mapped out on their level of importance. The more critical a plan describes, the stronger the actor supports that goal. Fig. 4 presents a map of the objectives of a sustainable agricultural development project.

Fig. 4 shows that all actors support or are not resistant to all the goals set. This situation can be seen as having no blue color on the goal bar graph. The highest support intensity is on the Build Rice Supply Connectivity Between Regions objective. This situation is appropriate because it can guarantee the availability of rice and price stability in all regions, increasing the farming community's welfare.

The next goal strongly supported by actors is providing subsidies and incentives to farmers and increasing the availability of agricultural facilities and infrastructure. Providing subsidies or incentives in the form of fertilizers and seeds is an essential factor in determining agricultural production. Seed is a characteristic of production and the foundation of agriculture, while fertilizer is a critical element in productivity. Seed and fertilizer subsidies are intended to ease the burden on farmers and transfer technology to farmers to use superior seeds and balanced fertilization at affordable

prices so that production and productivity increase. The increase in food production is expected to lead to a rise in the welfare of farmers.

One of the factors that can increase agricultural production is the support of farming facilities and infrastructure. Food is the primary basic need for humans that must be met at any time. The right to obtain food is one of the human rights. If food availability is less than needed, it can impact economic instability and various social and political upheavals. This issue happens when food security is disrupted. Support for agricultural infrastructure and facilities aims to increase productivity and production through efforts to expand agricultural land in food crop areas to offset land conversion. Then make efforts to rehabilitate irrigation networks, optimize land, increase the availability of farming tools and machinery, and improve the distribution of subsidized fertilizers so they are targeted.

The results of the subsequent analysis focus on the actor convergence map. Actor convergence describes the similarity of actors' attitudes toward goals. Actors with the same mindset will converge, while those with different perspectives will diverge. Convergence analysis is intended to discover the points of potential alliances of potential actors. Convergence maps can be used to determine which actors can work together to avoid potential conflicts. A description of possible actor alliances/cooperation in sustainable agricultural development projects can be seen in Fig. 5. It shows that Farmer Groups and Farmers are groups of actors that can form strong alliances to successfully develop sustainable agricultural potential.

CONCLUSION

Based on the MACTOR analysis of stakeholders in the sustainable agriculture development project in Sragen Regency, it can be concluded that farmer groups, farmers, and village heads are dominant actors with high influence in determining agricultural development policies. Their active involvement and knowledge play a crucial role in the success of the sustainable agriculture project. Policy recommendations to be considered include strengthening the role and support for farmer groups, enhancing the competitiveness and capacity of farmers, fostering collaboration between farmer groups and individual farmers, allocating adequate budget for agricultural infrastructure, involving the Department of Agriculture and Food Security, and conducting regular monitoring and evaluation. By empowering these key actors, sustainable agriculture development in Sragen Regency is expected to improve farmers' welfare, environmental sustainability, and food security.

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