



Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach

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Abstract. The agricultural sector which tends to be exploitative and ignores nature conservation is a threat to the continued availability of quality food. Excessive use of chemicals makes food availability less safe. The current climate change requires an agricultural system that is climate-resistant and sustainable. This research aims to develop a go-organic based sustainable agricultural strategy model with a green economy approach. This research uses a mixed methods approach. The data used in this research are primary data and secondary data. Analytical methods in this research is Matrix of Alliances and Conflicts: Tactics, Objectives and Recommendations (Mactor) analysis. The research results show that there are three important aspects in realizing sustainable agriculture, including economic, social and environmental aspects. Actors who have a strategic role are the Government, in this case the agricultural service, farmers, agricultural research institutions as well as the community and consumers. Meanwhile, other supporting actors are the agricultural industry and business world, non-governmental organizations, academics at universities, processing industries, traders and financial institutions. This research has limitations, namely that it only focuses on horticultural agriculture. Further research is expected to broaden the focus beyond just horticultural farming.

Keywords: Organic Agriculture, Green Economy, Mactor.

1 Introduction

Indonesia is an agricultural country that has abundant natural resources so it is very supportive of agricultural development. Agriculture is one of the sectors that absorbs the largest workforce [1] [2] [3]. Apart from that, agriculture also contributes to providing export commodities for Indonesia. One area that has abundant agricultural potential is Semarang Regency. The agricultural sector in Semarang Regency is largely concentrated at the foot of Mount Ungaran. Jetis Village is a village that has abundant agricultural potential. Almost the majority of residents in this village depend on the

agricultural sector for their livelihood. The agriculture that is widely developed in this village is the horticulture sub-sector. Even though it has abundant agricultural potential, the welfare of farmers, especially horticultural crop farmers in Semarang Regency, is still relatively low, this is evidenced by the low exchange rate for farmers in the horticultural crop sub-sector.

Horticultural crops are one of the export commodities that have a good market share in various countries. However, being able to penetrate the export market is not an easy thing. In the current era of globalization, many importing countries demand good quality agricultural products and are environmentally responsible. This is of course a challenge for farmers in Indonesia considering that there are still many agricultural commodities that have not implemented environmentally friendly agriculture [4] [5] [6]. The current agricultural system is still oriented towards productivity without regard for environmental sustainability. As a result, agricultural land is increasingly degraded due to erosion and excessive use of fertilizers and pesticides. However, in the long term, this will be a time bomb for the agricultural sector. If you want to be able to penetrate the international market, the agricultural sector must start improving to improve production quality and be environmentally responsible [7] [8] [9] [10].

Domestic and global market demands for agricultural products currently not only lead to demands for visible product quality, but also towards safety and nutrition as well as environmental responsibility.[11]. If excessive use of fertilizers and pesticides continues, it will be difficult to meet market demands. As a result, local agricultural products will be less competitive with agricultural products from abroad [12]. Jetis Village has a conventional farming system that is still relied on by farmers. This is because the need for chemical fertilizers and pesticides for horticultural crops is very high. To be able to improve the quality and quality of agriculture in Kopeng Village, appropriate efforts and strategies are needed. One effort that can be implemented to face existing challenges is to implement organic-based sustainable agriculture. Sustainable agriculture is the answer to these consumer demands. The character of this agricultural practice is the responsibility of horticultural producers (farmers) towards consumers (the products produced are quality and safe, and the production method can be traced/there is traceability; themselves (high productivity); social (safety, security and welfare of farm workers) , environment (wise use of pesticides, fertilizers and agricultural business facilities).

The implementation of organic-based sustainable agriculture is considered very appropriate for creating effective and efficient agriculture, responsible for consumers, farmers and of course the environment [13] [14]. The implementation of sustainable agriculture is expected to help farmers to increase the income they earn [15]. However, being able to implement sustainable agriculture is not an easy thing because it requires strategies and efforts that are designed appropriately and consistently. Implementing sustainable agriculture also requires awareness among stakeholders regarding agricultural practices from upstream to downstream. So that in practice, agricultural processes can be closely monitored and can produce quality products [16] [17].

Sustainable agricultural development efforts must involve various aspects. Identification of strengths, threats and potential must be carried out. Economic development

must be in line with environmental and social development [18] [19]. Efforts for sustainable agricultural development can be influenced by local government policy factors, such as policies providing modern agricultural infrastructure, increasing agricultural productivity with nanotechnology and also increasing investment in the agricultural sector. Apart from that, sustainable agricultural development can be carried out by implementing low-carbon agriculture [20] [21] [22]. Low carbon agriculture is agriculture that provides low carbon emissions or can be said to be environmentally friendly. Therefore, this research aims to develop a Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach.

2 Method

This research uses mixed methods which combines qualitative and quantitative methods. Implemented in Semarang Regency, specifically in Kopeng Village, location selection was based on the potential for sustainable agricultural development in Kopeng Village, because the majority of the population works in the agricultural sector. The data used in this research includes primary and secondary data. Secondary data was obtained from publications, reports and other sources to support the analysis, while primary data was obtained from Focus Group Discussions (FGD). The FGD results were analyzed using a factor and actor approach using the Mactor analysis tool (Fauzi, 2019). The informants and stakeholders involved in this FGD are:

- a) Organic Farmer
- b) Non-Organic Farmers
- c) Consumer Society
- d) Research institutions
- e) Agricultural Processing Industry
- f) College
- g) Trader
- h) Department of Agriculture
- i) Financial institutions
- j) Non-governmental organization

Data collection methods consist of in-depth interviews and questionnaires. Questionnaires were distributed to relevant informants to obtain data about the contribution and interaction of actors in the development of sustainable agriculture. The first analytical method used is descriptive statistical analysis to describe the potential and problems of the agricultural sector in Kopeng Village, Semarang Regency. Descriptive statistical analysis is used to describe collected data without intending to make general conclusions or generalizations. This analysis only consists of accumulating basic data in the form of descriptions without looking for or explaining relationships, testing hypotheses, making predictions, or drawing conclusions.

In the process of prospective strategy and scenario thinking, actors play an important role. Prospective analysis aims to rank stakeholder positions on various strategic issues, assess convergence and divergence, and anticipate coalitions and conflicts. In the long-term view, policymakers need to anticipate justifications for key future drivers that may influence key variables. The prospective analysis approach originates from a formal scenario planning methodology called "la prospective".

Mactor's method was developed in response to increasing criticism of traditional extrapolation-based forecasting methods. Godet (2000) further developed the methodology and procedures of the Mactor method for scenario analysis. Mactor's method is an analysis based on an alliance and conflict matrix that utilizes information in the main strategy table.

Mactor's method performs a thorough analysis of actor strategies and initiatives. Mactor (Alliance and Conflict Matrix: Tactics, Goals, and Recommendations) is based on the influence between actors. This method seeks to provide a global picture of the importance and possible outcomes of various issues, expected actor strategies, power relationships, and potential alliances and conflicts. The goal is to derive possible system evolutions in order to build better and more coherent scenarios. The Mactor method is used to see the preferences of each stakeholder and the level of support for the goals that have been identified (Ahmed et al., 2009). This method also determines the level of support of each stakeholder for each goal and group.

In this research, the Mactor method will identify actors/stakeholders involved in implementing integrated and sustainable agriculture in Kopeng Village, Semarang Regency. Once the actors are identified, they can be grouped based on their respective roles so that it is known whether the actor is a main actor, key actor, or supporting actor. With this concept, the input to MACTOR is via a position matrix (known as 1MAO [Matrix Actor Objective] and 2MAO) which uses Saliency variables from actor to objective. The third matrix is MID (Matrix of Direct Influence) which uses influence variables. In software calculations, user input only requires the MID matrix, 1MAO, and 2 MAO matrices. Then it will be calculated by a computer through a mathematical algorithm process. Based on the MID matrix, MACTOR then calculates the direct and indirect effects of one actor on other actors as mentioned previously. This matrix is a MIDI matrix (Matrix of Indirect and Direct Influence). The MIDI matrix from A to B is calculated via the formula:

$$MIDI_{A \rightarrow B} = MID_{A \rightarrow B} + \sum_C [\min(MID_{A \rightarrow C}, MID_{C \rightarrow B})]$$

This matrix is then used in the next stage to determine the "balance of power". Because of the balance of power, we must first calculate the total direct and indirect influence of the actor. If interpreted as the total direct influence of actor A on others (for example B), then: M_A

$$M_A = \sum_B (MIDI_{A,B}) - MIDI_{A,A}$$

If we define it as the total direct and indirect influence that A receives from other actors (in other words, actor A's dependency), then: D_A

$$D_A = \sum_B (MIDI_{B,A}) - MIDI_{A,A}$$

By using these two components with the basic coefficient of power, it is then calculated using the formula:

$$r_A = \left[\frac{(M_A - MIDI_{A,A})}{\sum_A(M_A)} \right] \times \left[\frac{M_A}{M_A + D_A} \right]$$

In the next step, MACTOR then calculates a matrix called r_A , namely the matrix which is basic and important in the discussion. This matrix is produced from a previous process or is a product of r_A and $3MAO$.

$$3MAO_{A,i} = 2MAO_{A,i} \times r_A$$

By knowing this matrix, various furniture can be produced. One of them is the mobilization coefficient which shows the reaction of each actor in a situation. This feature is generated through a formula $3MAO$

$$Mob_A = \sum |3MAO|$$

The results of the analysis also produce features of agreement and disagreement regarding a goal which are calculated through: $3MAO$

$$Ag_A = \sum_a (3MAO_{A,i} (3MAO > 0))$$

$$DisAg_A = \sum_a (3MAI_{A,i} (3MAO < 0))$$

3 Results and Analysis

Efforts to empower farmers based on agribusiness with a sustainable integrated farming system approach require collaboration and synergy from several related stakeholders/actors. These stakeholders come from regional government groups, village governments, communities, entrepreneurs, farmer organizations and non-profit organizations. The involvement of these stakeholders takes into account several things as follows:

1. These stakeholders/actors have the authority to develop the agricultural sector in Kopeng Village
2. These stakeholders/actors will be impacted by empowering agribusiness-based farmers with a sustainable integrated farming system approach
3. These stakeholders/actors are the prerequisites for success in developing the agricultural sector in Kopeng Village
4. These stakeholders/actors have the competence to empower farmers based on agribusiness with a sustainable integrated farming system approach

Based on these considerations, the stakeholders/actors who are the data sources in this research are as follows:

Table 1. Stakeholder/Actor Mapping

No	Stakeholders/Actors	Issue	Objective/Goals
1	Organic Farmer	Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach	Economic Aspect: 1. Farmers' income 2. Increased Productivity 3. Farming efficiency
2	Non-Organic Farmers		
3	Consumer Society		
4	Research institutions		Social Aspect: 4. Economic equality 5. Increased welfare 6. Poverty Reduction
5	Agricultural Processing Industry		
6	College		
7	Trader		Environmental Aspects: 7. Environmental sustainability 8. Biodiversity conservation
8	Department of Agriculture		
9	Financial institutions		
10	Non-governmental organization		

^a Source: Primary Data, 2024

Based on table 2, the mapping of actors involved and interested in the Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach consists of 10 actors. The composition of the actors involved shows heterogeneous characteristics and shows the involvement of organizations across sectors, across government and involving non-governmental institutions. These actors are entities that have interests and have a role in mobilizing their resources to influence the empowerment of farmers in Kopeng Village. Understanding the relationships between actors in empowering farmers is very necessary to understand the efforts of Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach in Kopeng Village. To understand the relationships between Actors/Stakeholders, researchers used Mactor software (matrix of Alliance conflict tactics operations and responses). The following presents the relationships between actors in the sustainable farming model for farmers in Kopeng Village.

Table 2 shows that the stakeholders who have high influence in the Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach are the Department of Agriculture with a score of 194, Organic Farmers with a score of 193 and Universities with a score of 189. Meanwhile, the stakeholders who have the most influence The lowest is the consumer community with a score of 172. Then the stakeholders who have a tendency to be highly dependent are organic farmers with a score of 208 and the processing industry with a score of 204. Meanwhile, the stakeholders who have the lowest dependency are universities with a score of 167.

Table 2. Influence and Dependency Matrix Between

MDII	Organic Farmer	Non-Organic Farmers	Consumer Society	Research institutions	Agricultural Processing Industry	College	Trader	Department of Agriculture	Financial institutions	Non-governmental organization	II
Organic Farmer	22	21	22	22	21	14	11	24	19	17	193
Non-Organic Farmers	21	24	21	20	20	15	13	14	23	14	185
Consumer Society	23	19	13	21	18	17	14	14	22	11	172
Research institutions	24	18	21	20	24	16	17	18	24	12	194
Agricultural Processing Industry	16	19	20	17	21	17	22	17	21	13	183
College	22	20	17	18	22	18	20	19	17	16	189
Trader	20	21	19	19	14	20	16	13	18	22	182
Department of Agriculture	22	22	24	12	23	23	19	18	14	17	194
Financial institutions	21	17	21	11	24	14	24	22	11	23	188
Non-governmental organization	17	16	19	20	17	13	21	23	16	24	186
In	208	197	197	180	204	167	177	182	185	169	1866

^a Source: Processed Primary Data, 2024

The actor preference matrix for goals, presents the preferences of the actors involved in efforts to realize sustainable agriculture in Kopeng Village towards the expected goals or targets which are included in three aspects, namely economic aspects, social aspects and environmental aspects. Economic aspects include Farmer Income, Increased Productivity and Farming Efficiency. Social aspects include economic equality in society, increasing welfare, reducing poverty. Environmental aspects include environmental preservation, biodiversity conservation. The degree of actor mobilization and objectives are presented in the following table 3.

Table 3. presents the position of each actor on each target/goal (objective) by considering the degree of opinion of the actors regarding the competitiveness target and the hierarchy of targets. The output of this matrix is two. The first is the degree of mobilization which will explain the target/objective that most mobilizes the players. actor. Second, mobilization which will explain the actors who are most mobilized to use resources to achieve these objectives or goals.

The degree of mobilization (bottom row) shows which goals are expected to become the main issues that provoke stakeholder reactions. In the Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach, the issues

of greatest concern are increasing productivity (20), economic equality (19), farming efficiency (17) and increasing farmer income (16). Meanwhile, the actors most mobilized were the Department of Agriculture (20), organic farmers (19) and consumer communities (19). These actors are the actors who are most actively mobilized in responding to problems in the development of sustainable agriculture in Kopeng Village.

Table 3. Degree of Actor Mobilization and Goals

2MAO	Farmers' income	Increased Productivity	Farming efficiency	Economic equality	Increased welfare	Poverty Reduction	Environmental sustainability	Biodiversity conservation	Absolute Sum
Organic Farmer	2	3	4	2	2	3	1	2	19
Non-Organic Farmers	1	3	2	1	1	0	-1	-2	5
Consumer Society	2	3	4	2	3	2	1	2	19
Research institutions	2	0	2	1	1	0	1	2	9
Agricultural Processing Industry	1	1	0	2	1	0	0	1	6
College	1	2	0	2	1	1	3	2	12
Trader	3	4	0	2	0	-4	-1	-2	2
Department of Agriculture	3	2	3	4	2	3	2	1	20
Financial institutions	1	2	0	2	3	2	1	0	11
Non-governmental organization	0	0	2	1	1	2	3	1	10
Number of agreements	16	20	17	19	15	9	10	7	
Number of disagreements	0	0	0	0	0	-4	-2	-4	
Number of positions	16	20	17	19	15	13	12	11	

Source: Processed Primary Data, 2024

Figure 1 explains that the degree of convergence (agreement and agreement) between actors in the development of sustainable agriculture in Kopeng Village generally tends to be moderate. Based on the objectives/goals and the role they have in mobilizing resources, we can map the actors with the "strongest convergences" who have the most important role in the development of sustainable agriculture. The actors who have the strongest convergence are the agricultural service, research institutions, and organic farmers. Organic farmers must be able to become influencers for inorganic farmers who still carry out inorganic farming so that they are willing to switch to organic farming because currently the majority of farmers in Kopeng still rely on organic farming. The very important role of these actors will be supported by actors in the

"strong convergences" category which consists of agricultural service actors, research institutions and also universities.

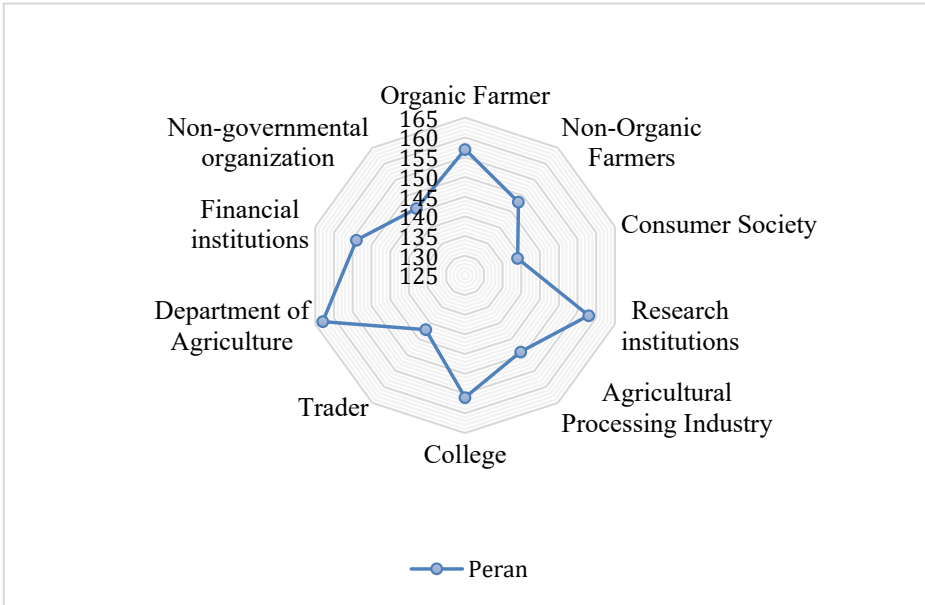


Figure 1. Pattern of Actors' Roles in Realizing Sustainable Agriculture

Source: Processed Data, 2024

The development of sustainable agriculture based on go-organics with a green economy approach is a holistic step that not only focuses on increasing agricultural yields, but also maintaining environmental balance and social welfare. This approach includes the use of organic farming techniques that avoid the use of synthetic chemicals, pesticides, and inorganic fertilizers, thereby maintaining healthy soil and water quality. Apart from that, organic farming also supports biodiversity, by implementing rotational cropping patterns and intercropping which helps reduce the risk of pests and diseases without damaging the natural ecosystem [23] [24].

In the context of a green economy, this strategy focuses on creating sustainable economic value through resource efficiency and reducing negative impacts on the environment [25]. Go-organic-based sustainable agriculture can encourage the use of local resources, such as compost and green manure produced from crop residues and organic waste, thereby reducing dependence on external inputs and increasing farmers' economic resilience [26] [27] [28]. In addition, this agricultural system encourages environmentally friendly technological innovation, such as the use of renewable energy for irrigation and processing of agricultural products [29].

The application of the green economy in organic farming also includes increasing market access for organic products through certification and clear labeling, which assures consumers of the authenticity and quality of the product [30]. This not

only increases farmer incomes, but also provides an economic incentive for farmers to switch to more environmentally friendly farming practices. Additionally, policy support from the government, such as subsidies for organic farming practices, tax incentives, and provision of education and training for farmers, is critical to encourage widespread adoption of this strategy [31].

Sustainable agriculture also includes social aspects by empowering local communities through organic-based cooperatives and farmer groups [32]. This encourages collaboration and knowledge sharing between farmers, increasing their capacity to manage land sustainably. This approach also focuses on the welfare of farmers by ensuring that they get a fair price for their products and have access to wider markets [33]. Thus, organic-based sustainable agriculture supported by green economy principles not only contributes to environmental sustainability, but also builds a strong and fair economic foundation for farming communities.

Optimizing the achievement of a green economy through sustainable agricultural development requires the integration of various elements, ranging from environmentally friendly agricultural techniques, technological innovation, supportive government policies, to empowering local communities [34] [35] [36]. Only with this integrated approach can we achieve a balance between agricultural productivity, environmental sustainability and the socio-economic welfare of farmers, creating a truly sustainable agricultural system.

4 Conclusion

Based on the results and discussion, it can be concluded that the actors who have a strategic role in the Go-Organic Based Sustainable Agriculture Strategy Model with a Green Economy Approach are the Government, in this case the agricultural service, farmers, agricultural research institutions as well as the community and consumers. Meanwhile, other supporting actors are the agricultural industry and business world, non-governmental organizations (NGOs), academics at universities, processing industries, traders and financial institutions. This research has limitations, namely that it only focuses on horticultural agriculture. Theoretically, this research enriches the literature on sustainable agriculture by integrating the concepts of organic agriculture and green economy, which may previously have been discussed separately. This creates a new theoretical model that can be used to understand and analyze how environmentally friendly agricultural practices can be combined with green economic principles to achieve holistic sustainability. In addition, this research contributes to social ecological theory by showing how interactions between green economic policies and organic farming practices can influence social welfare, local economies, and environmental sustainability. Practically, the implications of this research include providing guidance for policy makers, farmers and practitioners in implementing sustainable agricultural strategies. This research provides empirical evidence about the benefits of a go-organic approach supported by green economic policies, such as increasing agricultural productivity, farmer welfare, and environmental conservation. Farmers can use these findings

to adopt more efficient and environmentally friendly organic farming practices, while policymakers can design programs and incentives that encourage widespread adoption of these strategies. In addition, this research also offers practical guidance for market development for organic products, including the importance of certification and clear labeling, which can increase the added value and competitiveness of organic agricultural products in the global market. Thus, this research not only makes an academic contribution, but also has the potential to be directly applied in sustainable agricultural policies and practices.

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