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Sustainability Strategy for Organic Rice Agribusiness Development in Banggai Regency

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Abstract: The solution to reduce the negative impact of inorganic farming is to change to organic farming. The definition of organic farming is an agricultural cultivation system that uses natural organic materials. This study aims to analyze the level of sustainability of organic rice development in the social, economic, ecological, technological and infrastructure dimensions, governance and farmer ethics and develop a prioritization strategy for the sustainability of organic rice business development in Banggai Regency. The number of samples was 47 respondents. The data analysis method uses the RAP (Rapid Appraisal) method while for the determination of sustainability strategy decisions using SWOT Analysis and AHP. The results showed that the level of sustainability of the ecological, economic, social, technological and infrastructure dimensions, ethics and morals showed quite sustainable, and the development dimension showed very sustainable. Strategy selection is in quadrant I (IFAS 1.507 and EFAS 2.266) by focusing on aggressive growth in the development of sustainable organic rice agribusiness with strategic steps, namely: Optimizing organic rice production through the use of production input subsystems; optimizing extension activities in company-assisted farmer groups, inviting non-organic rice farmers to join the organic rice agribusiness business, expanding paddy fields to increase organic rice production, optimizing promotional activities for organic rice products, maintaining the quality of organic rice, making Sinorang Village and Sumberharjo Village into Organic Rice Agrotourism Villages, improvement and modification of organic rice packaging, provision of RMU assistance, and agricultural machinery equipment and developing self-reliance of organic rice farmer groups.

Keywords: Farming; Organic; Strategy; Sustainability

Introduction

Agribusiness is a business that includes agriculture, infrastructure, agricultural production, food processing, food trade, food distribution, and fiber for consumers (Wowor et al., 2023; Kaunang et al, 2024). One type of agribusiness is integrated farming system agribusiness. Integrated farming system (IFS) as a concept of farming system that combines two or more farms (Channabasavanna et al., 2009; Jayanthi et al., 2009; Ugwumba et al., 2010; Massinai, 2012; Walia & Kaur, 2013; Jaishankar et al., 2014) where there are input-output linkages between commodities and biological recycling processes (Prajitno, 2009; Changkid, 2013; Massinai, 2012; Thorat et al., 2015), which use low external inputs (Devendra, 2011; Nurcholis & Supangkat, 2011; Hilimire, 2011) and utilise resources efficiently (Bosede, 2010; Balemi, 2012 and Soputan, 2012), and apply various techniques so as to increase production, productivity and income of farmers and sustainably (Gupta et al., 2012; (Manjunatha et al., 2014; Thorat et al., 2015).

Rice plays an important role in the Indonesian economy because until now rice is still the staple food of the Indonesian population and the amount of consumption will continue to grow along with the increase in population in Indonesia (Hilalullaily et al.,

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2021). The level of rice consumption of the Indonesian population per capita can reach 120 kg per year, much greater than the world average rice consumption of around 60 kg per year (Hasanah, 2022), in 2022 per capita rice consumption of 1.802 kg per week or 93.95 kg per year (Mas'ud & Wahyuningsih, 2022).

Commitment in maintaining the amount of rice production with several steps to prevent the decline in rice production with the use of superior seeds, balanced and efficient use of fertilizers, pest and disease control, subsidies on various production inputs and the application of appropriate technology, increasing the ability of farmers to apply the potential factors of production properly (Arifin et al., 2022). Other efforts include simultaneous planting, breaking the chain of pests and diseases by sterilizing the land (Cordanis et al., 2023). The solution is an effort to solve the problem of fulfillment in maintaining rice production (Y. Hasanah & Hanum, 2020). The efforts made have a negative impact, namely the pollution of groundwater and surface water, the presence of residues from chemical pesticides that endanger human health, the use of chemical fertilizers that continuously degrade the quality of agricultural land, a decrease in biodiversity, and increased resistance of plant pest organisms to pesticides and reduced organic matter (Rosalina et al., 2021)

The solution to reduce the negative impact of inorganic farming is to change to organic farming. The definition of organic farming is an agricultural cultivation system that uses natural organic materials without the use of synthetic chemicals. The concept of organic rice cultivation is that it must be grown on environmentally friendly rice fields, not using chemical fertilizers, not using growth stimulating hormones and not using chemical pesticides from the beginning of planting land preparation to harvest and post-harvest, until rice is ready for consumption (Cahyati, T., & Hasan, F., 2021)

Increased public awareness of health and environmental conservation has also led to increased demand for healthy food sources, including organic rice. Although rice is basically a bulk commodity that is only differentiated based on its variety and physical conditions (such as broken grains, grains, degree of sosoh), which determine its category (such as premium, medium rice), rice will have a higher added value if other factors, such as environmental and health conservation considerations, are taken into account in the production process, and organic attributes become these differentiating factors and are expected to increase the competitiveness of agricultural products (Supyandi et al., 2014). The organic label becomes its own attraction in the assessment of people who are already concerned about health, as for the nutritional value contained in it, namely carbohydrates 76.41%, protein 9.78%, calories 8.97%, water 11.49%, fat 1.34% fiber 0.46%, amylose 16.97%, and does not contain heavy metals (Elizabeth, 2022).

The organic rice business in Banggai District is currently running but is still very limited to farmer groups that are assisted by the Community Social Responsibility program of an Oil and Gas company operating in Banggai District, namely the Bernas Farmer Group in Batui Selatan District and the Lestari Farmer Group in Moilong District, Banggai District.

Organic rice business in Batui Selatan District and Moilong District of Banggai Regency began in 2015 and currently organic rice farmer groups have been certified organic, the implementation of organic rice business strongly supports: (1) ecological aspects where fertilization treatment using organic fertilizers, the use of vegetable pesticides, in ecological aspects there is sustainability of nutrient availability, as well as controlling rat pests with natural predators, namely the use of Tytto alba birds, (2) economic aspects, in economic aspects, the selling price of organic rice is higher than non-organic rice so as to increase farmers' income, (3) Social aspects have an impact on the growth of organic rice processing units such as compost making businesses, as well as opportunities for additional organic farmers who originally cultivated non-organic rice to organic rice, (4) technological and infrastructure aspects have an impact on improving production roads to organic rice fields, organic certification, availability of organic rice sales locations and availability of organic rice seeds, (5) Institutional aspects, assistance and training in organic rice farming. The five aspects of the organic rice business in Batui Selatan Subdistrict and Moilong Subdistrict, Banggai Regency are already running.

The organic rice production data of farmer groups "Bernas" and "Lestari" at the Banggai Regency level for 1 (one) harvest season in 2021 with a total land area of 10.62 ha with a production of 51.17 tons or the equivalent of 32.76 tons of rice. Based on the data on the amount of organic rice production, of course, it is still very low when compared to the total harvest area and overall rice production at the Banggai Regency level, which is 0.028% of the total harvest area and 0.031% of the total rice production of Banggai Regency in 2021, and from the amount of harvest area for inorganic paddy fields, it is a potential development to be used as organic paddy fields.

The number of organic rice farmers spread across Banggai District, especially in the Moilong and Batui Selatan Districts, while organic rice farmers are members of organic rice farmer groups that have been certified organic with a total of 24 farmers. The number of organic farmers as many as 24 people, is a very small number when compared to the number of rice farmers

in Banggai District, this is influenced by the lack of interest of non-organic rice farmers to switch to organic rice farmers. One of the reasons why non-organic rice farmers have not switched to organic rice cultivation is the lack of information about organic rice cultivation technology.

Based on the background explanation above and direct review in the field, researchers want to see from the scientific side what constraints and obstacles affect the sustainability of organic rice business in Banggai Regency so that the results of this study can contribute ideas to the development policy of organic rice business activities.

Method

Stages of Research

The stages in this research consist of: 1). Literatur study scientific journal publication related to organic rice farming, identification of problems in the development of organic rice business; 2). Primary data collection and secondary data (interview respondents and literatur studies; 3). Data analysis of organic rice business sustainability (RAP Analysis); 4). Determining the sustainability strategy of organic rice business development (SWOT and AHP analysis). For more details can be seen in Figure 1.

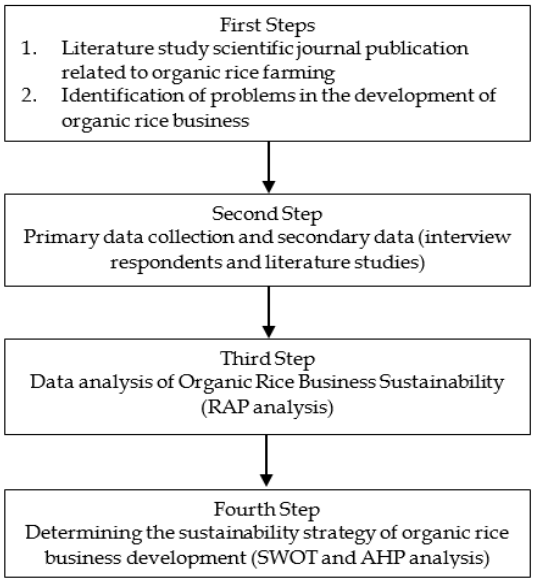

Figure 1. Flow chart of research stages

Data Types and Sources

Answering the research objectives (1) determining the level of sustainability of organic rice business using ecological, economic, social, technological and infrastructure, institutional and ethical data and answering research objectives (2) determining strategies in the development of organic rice business using data on strengths, weaknesses, opportunities and threats that come from within and outside the organic rice business environment. The types of data and data collection methods are presented in Table 1.

Tabel 1. Data Type, Data Collection Method and Data Analysis

Objective	Data Type	Data Collection	Data Analysis
Determining the level of sustainability of organic rice business	Ecological, economic, social, technology and infrastructure, institutional and ethical data*	1. Field observation 2. Literature Study	Analysis of index values/lever factors of organic rice business sustainability (RAP/ MDS)
Determine the development strategy of organic rice business	Strengths, Weaknesses, Opportunities and Threats Data	1. Field observation 2. Literature Study	SWOT Analysis, and AHP

Sample Determination

According to Sugiyono (2017) saturated sampling or census is a sampling technique when all members of the population are used as samples, the research respondents consisted of organic rice farmers in 3 (three) Farmer Groups with a total of 32 farmers, namely 8 members of the Bernas Farmer Group, 13 members of the Rani Seja Millennial farmer group in Batui Selatan District, 10 members of the Lestari Farmer Group in Moilong District who act as organic rice producers as well as the Regional Government in this case the Banggai Regency Agriculture Office, Academics, and Organic Rice Experts and organic rice consumers in Banggai Regency totaling 15 respondents to obtain in-depth opinions related to the development of organic rice, the total sample size was 47 respondents.

Data Collection

Data collection methods for both primary and secondary data used several data collection techniques, including:

1. Observation, is a data collection technique through direct observation and systematic recording of the phenomena being investigated and is very basic in conducting an inventory of the socio-economic characteristics of organic rice farmers at the research site, which includes primary data consisting of data on the general condition of the research location.

2. Interview, which is the process of obtaining information for research purposes by means of oral question and answer between two or more people with parties related to the object to be studied. Interviews conducted are guided by a list of questions (Questionnaire) that have been prepared beforehand, the questions to be asked include those related to the business undertaken by the main actors and business actors as well as the perceptions of stakeholders on the development of organic rice in Banggai Regency.
3. Literature Study, this method is used as a support in research conducted by searching for a number of references and documents sourced from local governments and the results of previous studies.
4. Conducting group discussion forums with experts who intersect with organic rice, namely the field of extension, the food sector, the field of quality control of food products, policy makers, the community development section and the academics section.

Data Analysis

Sustainability Status

Data analysis with MDS includes aspects of sustainability from the ecological, economic, social, technological and infrastructure and institutional dimensions, as well as ethics. Furthermore, multidimensional analysis is carried out by combining all attributes of the 5 (five) dimensions of sustainability above. To assess the sustainability status of organic rice farming, the RAP (Rapid Appraisal) method was used, which has been modified from the Rapfish program with procedures based on Fauzi (2019) as follows: (1) Review and define attributes (including various categories and scoring); (2) Scoring (constructing reference points for good and bad and anchor); (3) Multidimensional Scaling Ordination (for each attribute); (4) Monte Carlo Simulation; (5) Leverage Analysis; (6) Assess Sustainability.

The output of the Rapid Appraisal analysis is a sustainability index from 0-100 displayed in ordination and leveraging indicators. The sustainability index is grouped into four categories, namely 0-25 is categorized as poor (unsustainable); 25.01-50 (less sustainable); 50.01-75 (moderately sustainable) and 75.01-100 is categorized as good (highly sustainable) (Fauzi, 2019).

Sustainability Strategy Decision Making

SWOT analysis (Strength, Weakness, Opportunity, and Threat) is a tool to derive useful or effective strategies that are applied according to the market and public conditions at the time (Galavan, 2014). Opportunities and threats are used to understand the external environment, while strengths and weaknesses are identified through internal company analysis. SWOT compares strengths, weaknesses, opportunities, and threats. Strengths and weaknesses are examined to identify current and future opportunities and threats (Gurel & Merba, 2017).

SWOT analysis is a tool used in decision-making which requires surveying the internal environment for Strengths and Weaknesses, and surveying the external environment for Opportunities and Threats. Strategic decision making, using the Analysis Hierarchy Process (AHP), hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level is the goal, followed by the level of factors, criteria, sub criteria, and so on down to the last level of alternatives.

Result and Discussion

Sustainability Index of Organic Rice Farming

The value of the sustainability index of organic rice farming describes the status of sustainability, based on the results of processed data on the value of attribute scores on all dimensions, the value of the sustainability index of organic rice farming and statistical values are presented in Table 2.

Table 2. Sustainability Index of Organic Rice Farming in Banggai Regency

Dimension	Sustainability Index	Monte Carlo Simulation	R^2	Stress Value	Sustainability Status
Ecology	74.72	73.19	0.94	0.14	Moderately Sustainable
Economy	63.80	62.73	0.95	0.14	Moderately Sustainable
Social	74.21	73.19	0.95	0.13	Moderately Sustainable
Technology and Infrastructur	74.94	73.38	0.95	0.13	Moderately Sustainable
Institutional	80.84	79.24	0.94	0.13	High Sustainable
Ethics and Morals	65.54	64.79	0.94	0.14	Moderately Sustainable

Table 2 shows that the ecological, economic, social, technological and infrastructural as well as ethical and moral dimensions show a fairly sustainable status, while the institutional dimension shows a very sustainable status while the social dimension shows a very sustainable status, with a sustainability index value

>50%. The coefficient of determination (R2) of all dimensions is quite high at 0.94 - 0.95, indicating the level of diversity of the model can be explained 94% - 95% by the attributes included in the model. The stress value which is the standard deviation value of the Multidimensional Scale method is 0.13 - 0.14 < 0.25, which means that the accuracy of the configuration of points (goodness of fit) of the model built for the sustainability of all dimensions can represent a good model. The Monte Carlo value for all dimensions is less than 1, which means that the MDS calculation results have a high level of precision.

1. Ecological Dimension

The results of the sustainability analysis in the ecological dimension are quite sustainable, where the sustainability index value is 74.72 with a coefficient of determination that describes the diversity of attributes by 94%.

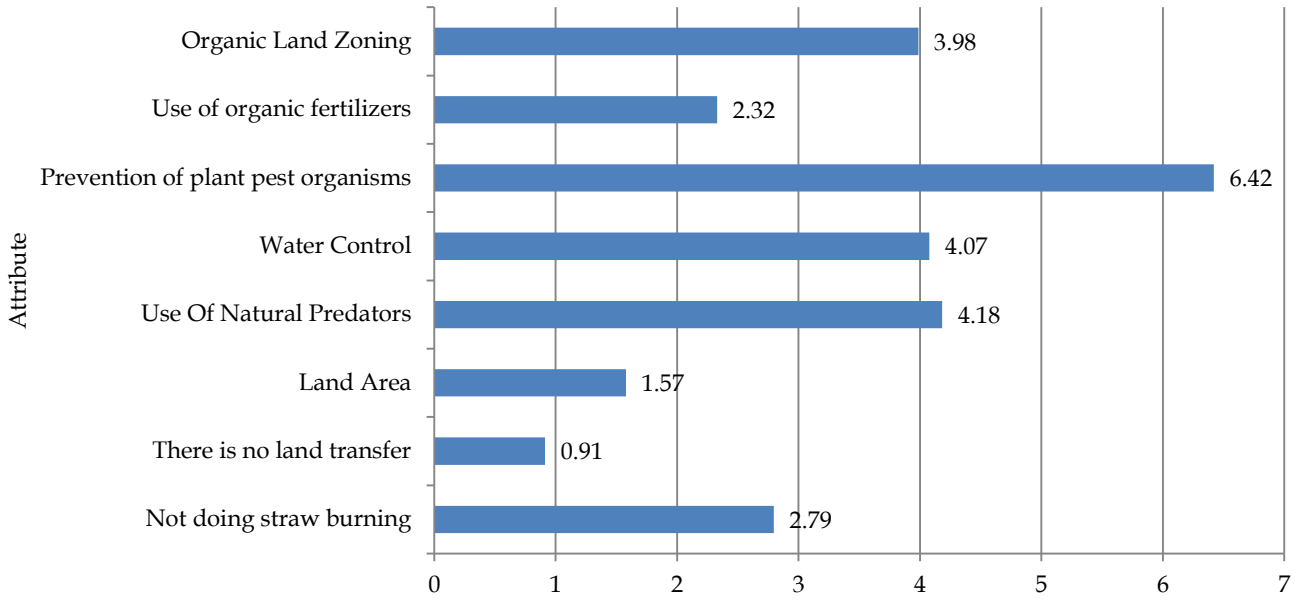

Figure 2. Leverage of Attributes

Based on figure 2 that Leverage analysis, the most sensitive attribute affecting the sustainability of organic rice in the ecological dimension is the activity of preventing the spread of plant disrupting organisms naturally by utilizing organic materials around organic rice fields, this is in line with research conducted by (Soleh et al., 2022) that in preventing the spread of plant disrupting organisms carried out with 2 (two) stages, namely prevention by using crop rotation and simultaneous planting, if preventive measures are not able to overcome the presence of pest then control is carried out using organic pesticides.

Another attribute that affects the sustainability of organiuk rice in the ecological dimension is the use of natural predators, namely in the form of a Tytto alba bird breeding program, as a predator of mice, and according to the conditions of the research field on each organic rice field bundle there is an Owl House (RUBUHA) and Tytto alba bird perch. The size of RUBUHA is 50 cm long x 50 cm wide x 60 cm high with a supporting pole height of 4 to 5 meters (Wardah & Budi, 2023), each owl house unit is 1 owl, which is obtained from captive breeding in Sumber Harjo Village and Sinorang Village. Tytto alba is a predatory bird that is a nocturnal bird, leaving the nest around 18:00 pm and returning to the nest at 04:00 am, rats become one of the owl's specific foods, adult owls can prey on 2-5 rats every day, the ability to detect prey from a distance of 500 meters with a range of up to 12 km from the nest (Pusparini & Suratha, 2018).

2. Economic Dimension

The results of the analysis of sustainability in the economic dimension show a fairly sustainable picture with a sustainability index value of 63.80 with a coefficient of determination describing the diversity of attributes by 95%. There are attributes that dominantly affect the sustainability of organic rice businesses, namely the area of organic rice land, business feasibility, product quality and promotional activities for organic rice products both through social media, electronic media such as radio and participating in exhibition activities.

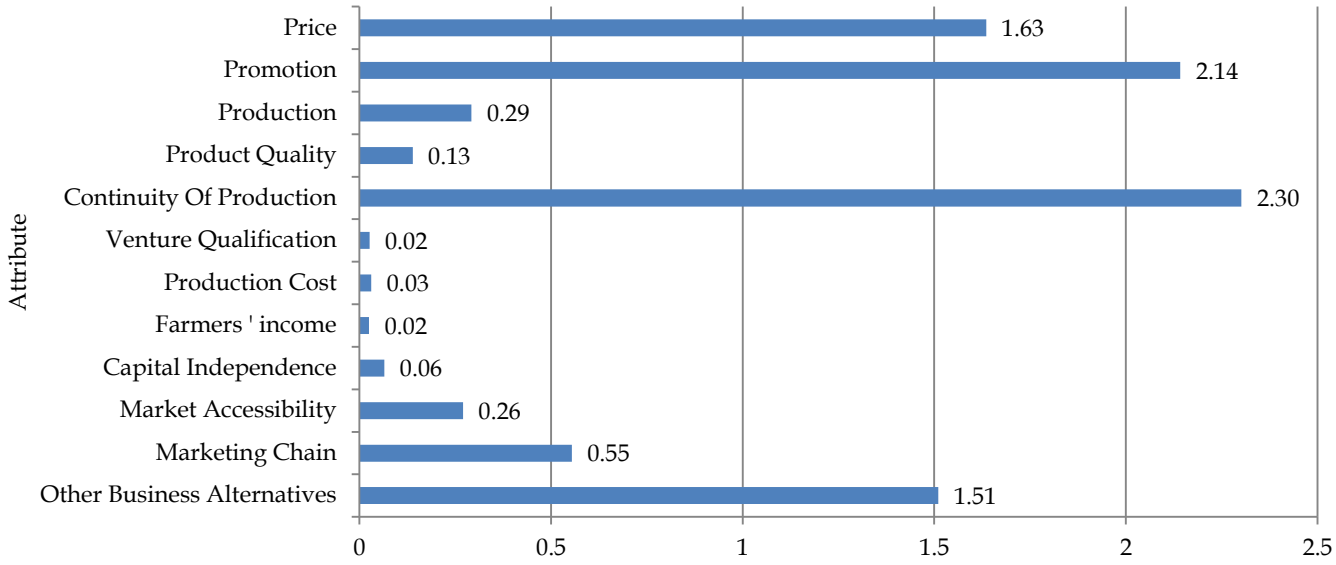

Figure 3. Production Continuity of Attributes

Based on Figure 3 showed that the attribute of production continuity is considered very important, due to the impact of a small amount of production every time it is always used up and needed by consumers, in addition to product continuity promotional activities are very intensely carried out both through social media and electronic media and exhibition activities followed by organic rice farmer groups, price attributes at the farm level for organic rice is Rp 14000 to Rp 15000 greater than the price of non-organic rice. In general, organic rice farmers do not have other side businesses, making the economic dimension quite sustainable. The results of research by Mukhlis et al, (2023), the increase in the price of rice production by Rp 1 / kg has a very significant effect on increasing the total income of rice farmers by Rp 5,721,003. Then, reinforced by the results of research by Mukhlis et al, (2024), the selling price of rice production received by farmers ranged from IDR 7,500/kg - IDR 7,800/kg,

3. Social Dimension

The results of the sustainability analysis in the social dimension show a fairly sustainable picture with a sustainability index value of 74.21 with a determination coefficient showing 95% of the diversity of attributes. The attributes that stand out are the availability of labor in the organic rice business and the existence of role models in organic rice, for role models currently in the research location has 2 local heroes in the field of organic rice farming and has succeeded in establishing 1 more organic rice group named "Rani Seja Millennial Farmer Group".

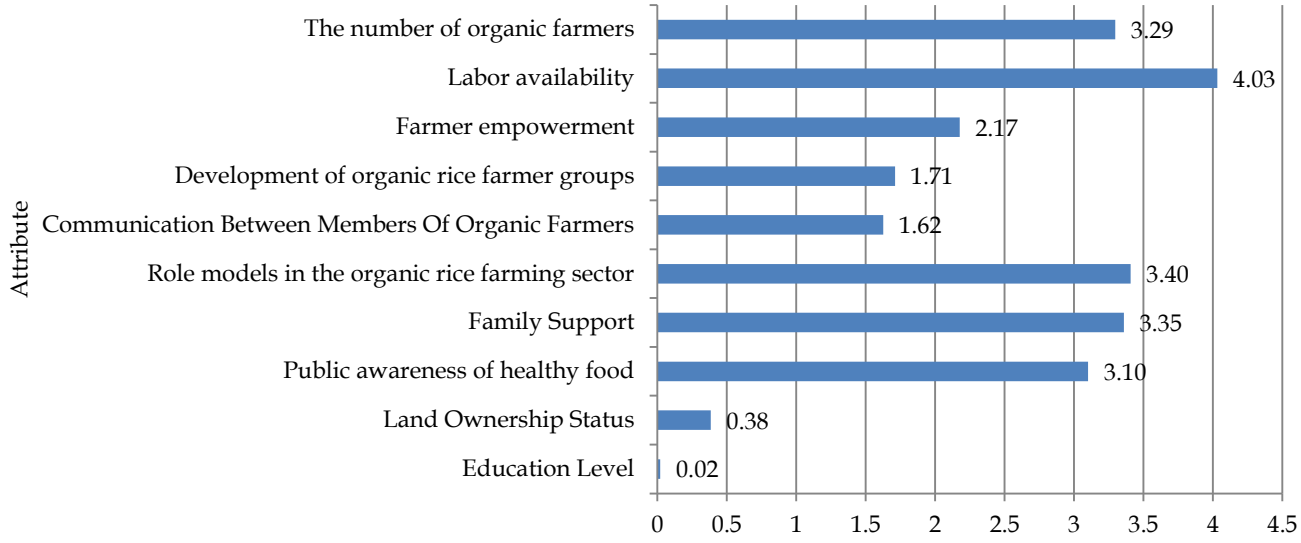

Figure 4. Considered important in sustainability Attributes

Based on Figure 4 showed that Attributes that are considered important in sustainability in the social dimension are the availability of organic rice workers who are sheltered in organic rice farmer groups, the number of organic rice farmers, role models (local heroes), family support and public awareness of healthy food and empowerment programs through the Community Development program of the JOB Pertamina Medco E&P Tomori Sulawesi company running well, With the empowerment of the Sumber Lestari Farmer Group and the Bernas Batui Selatan Farmer Group, it is hoped that they will become agents of change who will be able to invite organic rice cultivation and can establish new farmer groups which are part of the attributes of farmer group development and communication between farmer group members.

4. Technology and Infrastructure Dimensions

The results of the sustainability analysis in the social dimension show a fairly sustainable picture where the sustainability index value is 74.94, with the coefficient of determination showing 95% of the diversity of attributes. There are several attributes that stand out and have been carried out and available, namely product certification, standardization of the quality of organic rice products, livestock ownership, facilitation of technical irrigation facilities, equipment for making organic fertilizers and skills in mastering organic rice cultivation technology.

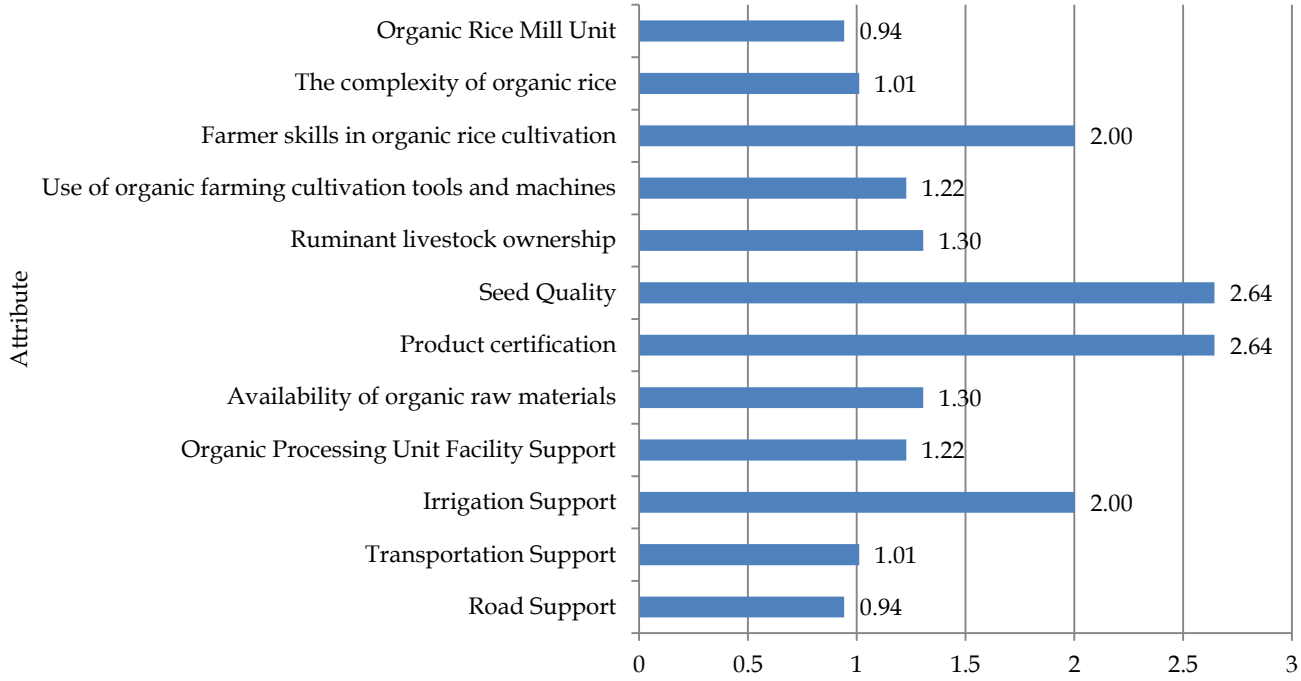

Figure 5. Require support Attributes

Based on the figure 5, there are still attributes that require support, namely the organic rice milling unit (0.94) and road facilities support (0.94), both attributes are considered necessary for improvement where currently organic rice farmers still use a general rice mill with the provision of the initial 10 kilograms of milling results separated and considered mixed with non-organic rice, and with the support of pure organic rice mills managed by farmer groups, organic rice production can be more.

5. Institutional Dimension

The results of the sustainability analysis in the social dimension show a very sustainable picture where the sustainability index value is 80.84, with the coefficient of determination showing 95% of the diversity of attributes. In the institutional dimension there are several attributes that have been running and ongoing and affect the sustainability process of organic rice businesses in Banggai Regency, namely mentoring activities, extension activities, participation in training activities, the role of universities, the role of organic rice certification bodies, the role of organic rice farmer groups, partnerships in organic rice marketing, the role of corporate CSR and the role of government in supporting Organic rice agribusiness activities, while the role of seed centers is not so significant this is because the organic rice seeds used come from organic rice farming activities which were originally assistance from the company's CSR program.

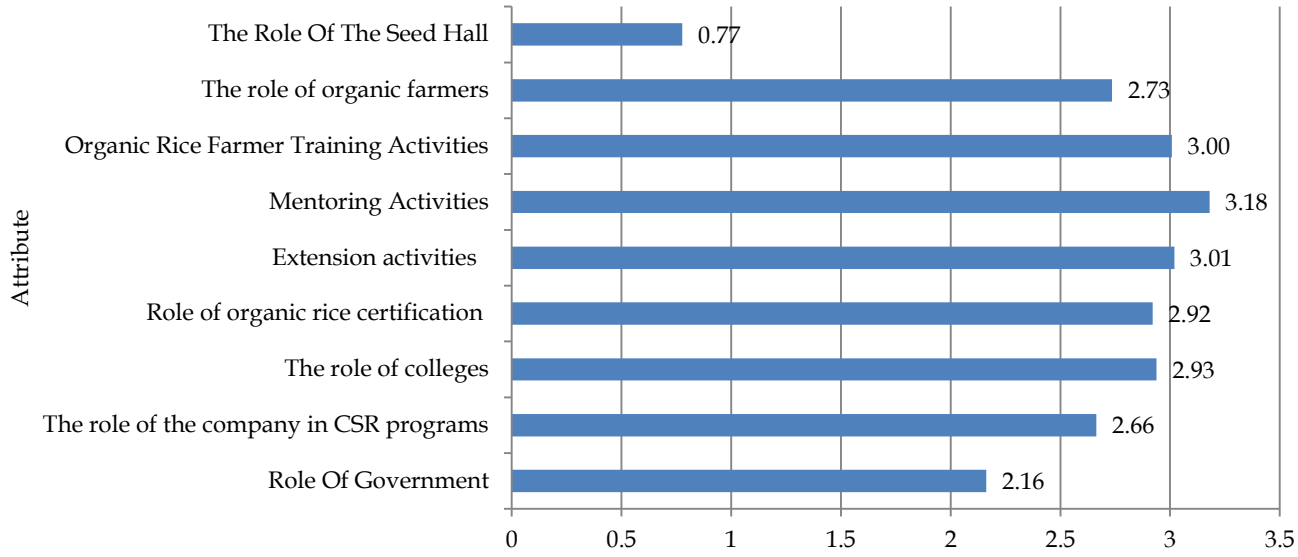

Figure 6. Need to be improved Attributes

Based on the figure 6 that there are still attributes that need to be improved is the role of seed centers with a score of 0.77 where it is expected to support the distribution of organic rice seeds to organic rice groups Lestari, bernas batui Selatan and Millennial Rani Seja. The attribute with the highest score of 3.18 is the role of organic rice farmer group mentoring activities carried out through the company's CSR program. The benefits of mentoring as a process of transferring science and technology consistently in organic rice farming businesses so as to realize awareness, skills and economic improvement of organic rice farmers, this is in line with what was stated by (Saribanon et al., 2024) community empowerment is the right entry point to transfer knowledge to the community and the adoption of science and technology can be applied consistently by users, so that farmers become more prosperous both in economic and social terms and have a positive environmental impact due to the transition of chemical-based agricultural practices to organic.

6. Ethical and Moral Dimensions

The results of the sustainability analysis in the social dimension show a fairly sustainable picture where the sustainability index value is 65.54, with the coefficient of determination showing 94% of attribute diversity.

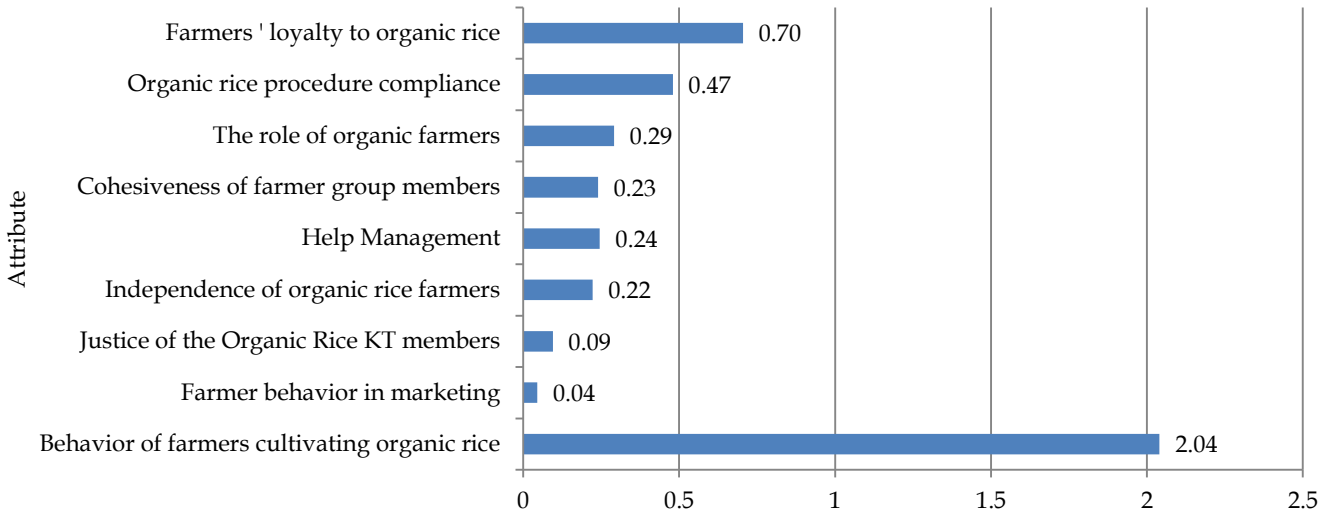

Figure 7. Need to be improved Attributes

Based on the figure 7, the prominent attribute is the behavior of organic rice farmers in carrying out agribusiness purely according to the instructions of organic rice farming that has been set by the government

and the certification valley. Other attributes are the loyalty and compliance of organic rice farmers, the cohesiveness of farmer group members, and the ability to manage the assistance received and the independence of farmers and organic rice farmer groups. The management of assistance in question is an effort made seriously in the utilization of assistance received by farmer groups, as well as the independence of farmers and farmer groups that have been built since 2015 making Bernas Batui Selatan farmer groups and Tani Lestari Sumber Harjo groups independent in the management of farmer groups.

Determination of Sustainability Strategy Decision

1. SWOT

Internal Factor Analysys (IFAS) score is 1.507, meaning that internal conditions are very strong in overcoming weaknesses that affect the sustainability of organic rice agribusiness,

Table 3. Internal Factor Analysys (IFAS)

Internal Strategy Factors		Bobot	Rating	Bobot Score
Strengths				
1	Farmers' commitment in carrying out the procedures of SNI 6729:2016 Organic Farming System	0.06	3.93	0.218
2	Organic Certification for Organic Rice Farmer groups	0.06	4.00	0.227
3	Public awareness of healthy food patterns	0.05	3.40	0.183
4	The existence of mentoring, coaching and training in organic rice cultivation	0.06	3.53	0.210
5	The role of organic rice farmer groups	0.06	4.00	0.238
6	Availability of organic rice seeds	0.05	3.80	0.202
7	Availability of materials for making organic fertilizers and materials for making vegetable pesticides.	0.05	4.00	0.196
8	Farmers' skills in making organic fertilizers and vegetable pesticides.	0.05	3.67	0.195
9	The existence of breeding and the use of natural predators in organic farming in the form of Tytto alba birds.	0.05	3.87	0.195
10	Farmers' experience in organic rice business	0.06	3.73	0.209
11	Low production costs of organic rice business	0.05	3.80	0.202
12	Availability of organic rice marketing network	0.05	4.00	0.204
Weakness				
1	The zoning of organic farmland is still located adjacent to non-organic rice farms.	0.06	3.00	0.180
2	The amount of organic rice paddy area is still very small	0.06	2.47	0.140
3	The use of agricultural tools and machinery that are the same as the units used for non-organic farming	0.05	2.80	0.130
4	Farmers Group does not have an Organic Processing Unit (UPO)	0.04	2.80	0.120
5	Farmer groups do not have an Organic RMU	0.05	2.80	0.140
6	Agricultural extension activities that have not touched the company-assisted farmer groups	0.05	2.93	0.130
	Total (Strengths - Weakness)	1.00		1.507

One of the strong factors in the internal environment is the existence of organic rice farmer groups that play a role in coordinating the implementation of organic rice agribusiness businesses in each member, the score value for the role of farmer groups is 0.238. Another factor is the experience of farmers in cultivating organic rice with a score is the factors that become the strength of the farmer group has been certified organic with a score of 0.227., and the commitment of farmers in carrying out the procedures of SNI 6729: 2016 Organic Farming System in the field of organic rice (0.218).

Strategic internal factors that become weaknesses are the zoning of organic rice farms that are located adjacent to non-organic rice farms to be one of the biggest weakness factors with a score of 0.18., the number of organic rice fields that are still limited has a score of 0.14., followed by the factor of not having separate agricultural tools and machinery with non-organic agriculture and organic rice milling machines into additional weakness factors in organic rice agribusiness with a score of 0.13 and 0.14 respectively.

The external strategy factor score shows the condition of opportunities or prospects for organic rice is greater than the threats posed to the organic rice agribusiness business field with a score value of the reduction result between strengths and weaknesses of 2.266.

Table 4. Results of External Factor Analysis

External Strategy Factors		Bobot	Rating	Bobot Score
Opportunities				
1	Rice paddy area in Banggai Regency	0.10	4.00	0.412
2	The existence of assistance provided by the company in the Organic rice CSR program	0.10	3.33	0.335
3	Public awareness of healthy food patterns	0.11	3.47	0.397
4	Market prospects and increasing demand	0.11	3.53	0.405
5	Government attention in organic rice farming	0.09	3.60	0.321
6	The existence of a government program to make tourist villages for Organic farming areas	0.10	3.60	0.371
7	Rapidly developing information technology	0.09	4.00	0.377
8	Availability of mechanization technology for making organic fertilizers and vegetable pesticides	0.09	3.20	0.281
Threat			`	
1	Fulfillment of semi-organic rice products in the market	0.09	2.47	0.220
2	Competition in the sale of organic and non-organic rice	0.11	3.93	0,420
	Total (Opportunities - Threats)	1.00		2.266

Indicators of external factors for the sustainability of organic rice agribusiness show a score of 2.266 which means that external conditions are positive in responding to opportunities and threats faced, and opportunities owned are able to minimize the threats faced in the sustainability of organic rice agribusiness activities. Indicators of strong external factors in the organic rice development strategy are the availability of large areas of agricultural land with a score of 0.412., the next indicator is the market prospects and the increasing demand for organic rice agricultural products with a score of 0.405., these two factors are closely related where the need for organic rice cannot be covered by the amount of production produced or organic rice will always run out in the market after each harvest activity, another indicator of strength in the development of organic rice is public awareness of healthy food with a score level of 0.397. Indicators that pose a threat are competition for the sale of organic and non-organic rice and the fulfillment of semi-organic rice products in the market, both traditional markets and mini markets in Banggai Regency with a score of 0.420 and 0.220 respectively.

It is known that the total identification score of internal factors is 1,507 and external factors are 2,266, indicating that the selection of strategies is in quadrant I in the selection of alternative strategies by focusing on aggressive growth utilizing the strengths possessed to capture existing opportunities in the development of sustainability of organic rice agribusiness.

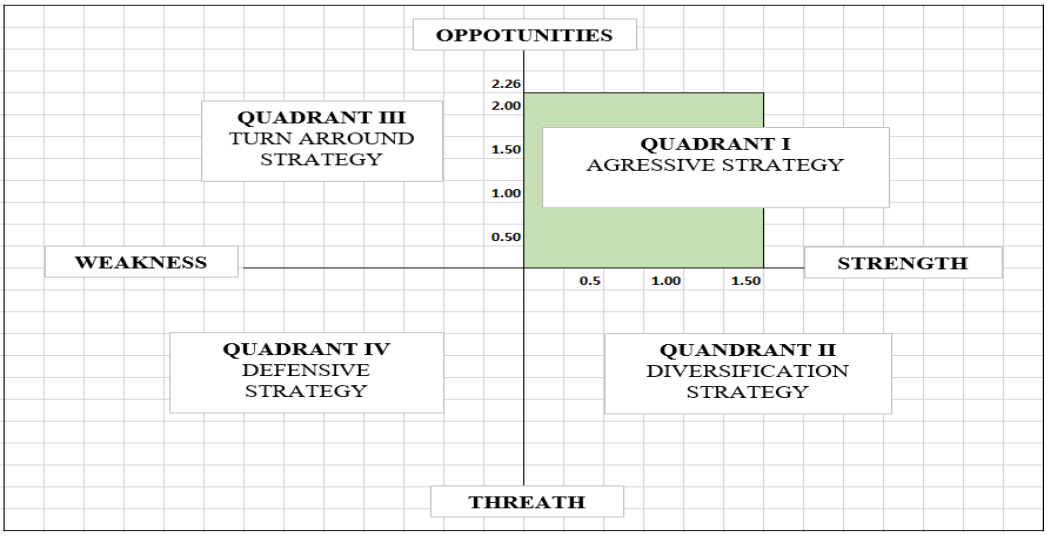

Figure 8. Matrix Strategy SWOT analysis

Based on Figure 8, it is clear that Aggressive strategies, diversification, turn around and defensive strategy options can be taken into account in policy making for organic rice agribusiness development strategies in Banggai Regency. Based on the SWOT

analysis results regarding the Coconut Agribusiness Development Strategy in North Minahasa Regency, the position is in quadrant I, which is the aggressive strategy with coordinate values (0.42:0.44) (Kaunang et al., 2024).

Internal Factors Strengths and Weaknesses External Factors Opportunities and Threats	Strength 1. Commitment of farmers in carrying out the procedures of SNI 6729:2016 Organic Farming System 2. The existence of assistance provided by the company in the Organic rice CSR program 3. Public awareness of healthy food patterns 4. The existence of mentoring, coaching and training in organic rice cultivation 5. The role of organic rice farmer groups 6. Availability of organic rice seeds 7. Availability of materials for making organic fertilizers and materials for making vegetable pesticides 8. Farmers' skills in making organic fertilizers and vegetable pesticides 9. The existence of breeding and the use of natural predators in organic farming in the form of Tytto alba birds 10. Farmers' experience in organic rice business 11. Availability of organic rice marketing network	Weakness 1. Zoning of organic farmland is still located adjacent to non-organic rice farms 2. The amount of organic rice paddy area is still very small 3. The use of the same agricultural tools and machinery as the units used for non-organic farming 4. Farmer groups do not have an Organic Processing Unit (UPO) 5. The Farmer Group does not have an Organic RMU 6. Agricultural extension activities that have not reached the company-assisted farmer groups.
Opportunity 1. Rice paddy area in Banggai District 2. The existence of assistance provided by the company in the Organic rice CSR program 3. Public awareness of healthy food patterns 4. Market prospects and increasing demand 5. Government attention in organic rice farming 6. The existence of a government program to make a tourist village for Organic farming areas 7. Rapidly developing information technology 8. Availability of mechanization technology for making organic fertilizers and vegetable pesticides	Strategy (S-O) - Maintain the quality of organic rice produced - Optimizing organic rice production through the use of production input subsystems in fulfilling the market - Expanding the area of organic rice fields to increase organic rice production - Developing the independence of organic rice farmer groups - Making Sinorang Village and Sumber Harjo Village into Organic Rice Agrotourism Villages	Strategy (W-O) - Inviting non-organic rice farmers to join the organic rice agribusiness business - Provision of RMU assistance, and agricultural machinery equipment - Optimizing extension activities in company-assisted farmer groups
Treath 1. Fulfillment of semi-organic rice products in the market 2. Competition in the sale of organic and non-organic rice	Strategy (S-T) - Optimizing promotional activities for organic rice products	Strategy (W-T) - Improvement and modification of organic rice packaging

2. AHP

The determination of the best alternative strategy for the sustainability of organic rice agribusiness is carried out using the AHP method, by summing up the scores on the combination of strength indicators and opportunity indicators.

Tabel 5. Alternative Strategies for Sustainability of Organic Rice Agribusiness in Banggai District

Strategy	Strategy Alternative	AHP CI = 0.09	RANK
S – O	Optimizing organic rice production through the use of production input subsystems in fulfilling the market	18.69	1
W – O	Optimizing extension activities in company-assisted farmer groups	15.65	2
W – O	Inviting non-organic rice farmers to join the organic rice agribusiness business	14.04	3
S – O	Expanding the area of organic rice fields to increase organic rice production	13.01	4
S - T	Optimizing promotional activities for organic rice products	10.68	5
S – O	Maintain the quality of organic rice	8.66	6
S – O	Making Sinorang Village and Sumber Harjo Village into Organic Rice Agrotourism Villages	8.14	7
W - T	Improvement and modification of organic rice packaging	7.88	8
W – O	Provision of RMU assistance, and agricultural machinery equipment	7.79	9
S – O	Developing the independence of organic rice farmer groups	7.71	10

Each strategy formed aims to meet the objectives to be achieved. The results of strategy prioritization are not a process of selecting one of the best strategies, but sequential priority results according to the combination of SWOT and AHP, the results of this priority do not have to be applied sequentially based on the score, the priority of alternative strategies made in this study does not indicate the order of strategy implementation time but based on stakeholder policies when the strategy will be implemented as an example of the current strategy that has been carried out is to become Sinorang and Sumberharjo villages into organic rice agribusiness ecotourism villages.

1. Optimizing organic rice production through the use of production input subsystems and market fulfillment. The combination of indicators that determine the choice of this alternative is public awareness of healthy food, the role of organic rice farmer groups, the availability of Organic Seeds, materials for making organic fertilizers and vegetable pesticides, farmers 'skills, the use of natural predators in handling rat pests, farmers' experience, low production costs and the availability of organic rice marketing networks and supported by advances in Information Technology and mechanization technology for making organic fertilizers and vegetable pesticides.
2. Optimizing counseling activities on farmer groups assisted by the company with a score of 15.65. This strategy is included in the diversification quadrant where the government's attention to organic rice agribusiness can intensify counseling programs for organic rice farmers.
3. Inviting non-organic rice farmers to join or switch to organic rice agribusiness, becoming one of the alternatives for expanding oirganic rice planting areas that can ultimately increase organic rice production, for this alternative to be the third strategy in an effort to develop the sustainability of organic rice agribusiness with a total score of 14.04.
4. Expand or increase the area of organic rice fields with a total score of a combination of strength and Opportunity Indicators of 13.01. The combination of indicators between the strengths and opportunities that determine the area expansion strategy is organic certification, public awareness of healthy food, low production costs combined with non-organic rice fields, promising market prospects, government attention in organic rice farming in the form of providing assistance that supports organic rice agribusiness activities, namely assistance with agricultural machinery equipment and programs to make Sinorang village and Sumberharjo village become organic rice tourism villages. In addition to these indicators, other efforts are carried out by socialization activities to local farmers who are not yet members of the organic rice farmer group to switch to organic rice farmers, and it is hoped that existing organic rice farmers will become examples in organic rice agribusiness.
5. Optimization of promotional activities both through exhibitions, social media and electronic media, is a strategic choice to minimize weaknesses by utilizing opportunities, is an activity that supports the marketing of organic rice.
6. Maintaining the quality of organic rice products is by maintaining the commitment of farmers in carrying out procedures and certification of organic rice, following the guidance and training programs of organic rice cultivation, utilizing organic rice production inputs and supported by Information Technology and mechanization in the field of organic rice farming.
7. Making Sinorang Village and Sumber Harjo village into organic rice agro-tourism villages, the

indicator that determines this alternative choice is that organic rice farmers in the region are farmers who purely cultivate organic rice, and have been certified organic. rice, it is supported by the government's program of agritourism Village area.

8. Improve the packaging of organic rice products, so that with good and attractive packaging by including the name of the variety, excellence, organic certification number and attractive images on the packaging can compete with semi-organic rice products sold in minimarkets in Banggai Regency, with these improvements can attract consumers to buy organic rice products.
9. Providing assistance RMU (Rice Miling Unit) and other agricultural machinery intended for organic rice farmer groups so as to minimize the mixing of non-organic rice into organic rice during harvesting and milling activities.
10. Developing the independence of organic rice farming groups with supporting indicator components, namely mentoring, coaching and training activities for members of organic rice farming groups, in the development of organic rice independence, it is expected that members of organic rice farming groups will now become agents of change in forming and forming and advancing other organic rice farming groups.

Conclusion

The conclusions obtained in this study are as follows: (1) Organic rice agribusiness in Banggai Regency is quite sustainable in the dimensions of ecology, economy, technology and infrastructure, social, ethics and morals with a sustainability index value above 50%; (2) In the aspect of the very sustainable development dimension, this is known by the sustainability index value of 80.84%, in the aspect of the institutional dimension supported by the role and function of related institutions and institutions that support organic farming activities in Banggai Regency; (3) The strategy carried out for the development of organic rice sustainability in Banggai Regency based on the results of SWOT analysis is on an Aggressive strategy with strong strengths able to capture existing opportunities, with the value of quadrant I values (1,057; 2,266); (4) The priority steps that need to be taken in the strategy of developing organic rice sustainability in Banggai Regency are: (a) Optimizing organic rice production through the use of production input subsystems in meeting the market; (b) Optimizing extension activities in company-assisted farmer groups; (c) Inviting non-organic rice farmers to join the organic rice agribusiness business; (d) Expanding the area of organic rice fields to increase organic rice production; (e) Optimizing promotional activities for organic rice products; (f) Maintain the quality of organic rice; (g) Making Sinorang Village and Sumberharjo Village into Organic Rice Agrotourism Villages; (h) Improvement and modification of organic rice packaging; (i) Provision of RMU assistance, and agricultural machinery equipment; (j) Developing the independence of organic rice farmer groups.

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Author Contributions

This research was conducted by several authors with different contributions. Bakri Muala was responsible for the design of the research analyses, field data collection, and primary data. Made Antara and Alimudin Laapo contributed to the development of the theoretical framework and in-depth literature review, as well as drafting the discussion section. Effendy and Hadayani contributed to the methodology, assisted with data processing, and proofread the write-up. All authors have read and approved the final submitted manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

References

Arifin, Biba, M. A., Azisah, Sadat, M. A., & Mardiyati, S. (2022). Kontribusi dan Trend Produksi Padi Daerah Pengembangan Sulawesi Selatan, Indonesia. *Jurnal Agrica*, *15*(1), 48–60. https://doi.org/10.31289/agrica.v15i1.6339

Cahyati, T., & Hasan, F. (2021). Efisiensi Teknis Usahatani Padi Organik di Desa Sumberngepoh Kecamatan Lawang Kabupaten Malang. *Jurnal Ekonomi Pertanian Dan Agribisnis*, *5*(3), 606–617. https://doi.org/10.21776/ub.jepa.2021.005.03.1

Changkid, N. (2013). The Factors Production Use Efficiency in the Integrated Farming in Suratthani Province, Southern Thailand. *Procedia - Social and Behavioral Sciences*, *91*, 376–384. https://doi.org/10.1016/j.sbspro.2013.08.434

Channabasavanna, A. S., Biradar, D. P., Prabhudev, K. N., & Hegde, M. (2009). Development of profitable

integrated farming system model for small and medium farmers of Tungabhadra project area of Karnataka. *Karnataka J. Agric. Sci*, *22*(1), 25–27. http://ndpublisher.in/admin/issues/IJAEBV6I4p.pdf

Cordanis, A. P., Vivi, M., Bana, M., Gangkur, F., Kantus, L. D., & Wagung, N. (2023). Peningkatan pemahaman pertanian organik kepada petani padi sawah. *JMM (Jurnal Masyarakat Mandiri)*, *7*(4), 3613–3620. https://doi.org/10.31764

Devendra, C. (2011). Integrated tree crops-ruminants systems in South East Asia: Advances in productivity enhancement and environmental sustainability. *Asian-Australasian Journal of Animal Sciences*, *24*(5), 587–602. https://doi.org/10.5713/ajas.2011.r.07

Elizabeth, R. (2022). Pengaruh Consumer Lifestyle dan Ragam Olahan Terhadap Permintaan Beras Organik. *Journal of Social and Economics Research*, *4*(1), 1–14. https://doi.org/10.54783/jser.v4i1.35

Fauzi, A. (2019). *Teknik Analisis Keberlanjutan*. PT. GRAMEDIA.

Galavan, R. (2014). *Doing Business Strategy*. NuBooks.

Gupta, V., Rai, P. K., & Risam, K. S. (2012). Integrated Crop-Livestock Farming Systems : A Strategy for Resource Conservation and Environmental Sustainability. *Indian Research Journal of Extension Education*, *II*(Volume II), 49–54. https://www.ijiras.com/2017/Vol_4-Issue_6/paper_21.pdf

Gurel, E., & Merba, T. (2017). Swot Analysis: A Theoretical Review. *The Journal of International Social Research*, *10*(51), 994–1006. https://doi.org/Doi Number: http://dx.doi.org/10.17719/jisr.2017.1832 SWOT

Hasanah, L. (2022). Analisis Faktor-Faktor Pengaruh Terjadinya Impor Beras di Indonesia Setelah Swasembada Pangan. *Growth: Jurnal Ilmiah Ekonomi Pembangunan*, *1*(2), 57–72. https://e-journal.unimaju.ac.id/index.php/GJIEP/article/view/6/5

Hasanah, Y., & Hanum, H. (2020). Upaya Meningkatkan Produksi Beras Organik sebagai Produk Pangan Sehat Unggulan di Deli Serdang TALENTA Conference Series Upaya Meningkatkan Produksi Beras Organik sebagai Produk Pangan Sehat Unggulan di Deli Serdang. *Talenta Publisher*, *3*(2). https://doi.org/10.32734/anr.v3i2.964

Hilalullaily, R., Kusnadi, N., & Rachmina, D. (2021). Analisis Efisiensi Usahatani Padi di Jawa dan Luar Jawa, Kajian Prospek Peningkatan Produksi Padi Nasional. *Jurnal Agribisnis Indonesia*, *9*(2), 143–153. https://doi.org/10.29244/jai.2021.9.2.143-153

Hilimire, K. (2011). Integrated crop/livestock agriculture in the United States: A review. *Journal of Sustainable Agriculture*, *35*(4), 376–393. https://doi.org/10.1080/10440046.2011.562042

Jaishankar, N., Janagoudar, B. S., Kalmath, B., Naik, V. P., & Siddayya, S. (2014). *Integrated Farming for Sustainable Agriculture and Livelihood Security to Rural Poor*. 22–24. https://doi.org/10.17758/iaast.a0514013

Jayanthi, C., Vennila, C., Nalini, K., & Chandrasekaran, B. (2009). Sustainable integrated management of crop with allied enterprises. *Sustainable Agriculture*, 21–27. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=58faa81dcf1cd70079e6e843ad912af9012c9446

Kaunang, R., Taroreh, M. L. G., Ngangi, C. R., & Mukhlis, M. (2024). Analysis of Coconut Agribusiness Development Strategy in North Minahasa Regency. *Jurnal Penelitian Pendidikan IPA*, *10*(7), 4212–4219. https://doi.org/10.29303/jppipa.v10i7.8500

Manjunatha, S. ., Shivmurthy, D., Satyareddi, S. A., Nagaraj, M., & Basavesha, K. (2014). Research and Reviews : Journal of Agriculture and Allied Sciences Integrated Farming System - An Holistic Approach : A Review . *Journal of Agriculture and Allied Sciences*, *3*(4), 30–38. https://www.rroij.com/open-access/integrated-farming-system--an-holistic-approach-a-review.pdf

Mas'ud, & Wahyuningsih, S. (2022). *Statistik Konsumsi Pangan 2022*. Center For Agricultural Data And Information System.

Massinai, R. (2012). *Pengembangan Model Agroindustri Berbasis Sistem Usahatani Terpadu*.

Mukhlis, M., Ismawati, I., Sillia, N., Fitrianti, S., Ukrita, I., Wisra, R. F., Raflis, H., Hendriani, R., Hanum, L., Ibrahim, H., Nofianti, S., Marta, A., & Sari, N. (2024). Characteristics of Production Factors and Production of Zero Tillage System Rice Farming. *Jurnal Penelitian Pendidikan IPA*, *10*(8), 6013–6019. https://doi.org/10.29303/jppipa.v10i8.8542

Mukhlis, Wisra, R. F., Hendriani, R., & Sari, N. (2023). Analisis Faktor-faktor yang Mempengaruhi Pendapatan Padi Organik di Kecamatan Harau. *AGROBIOS*, *21*(2), 183–190. https://unars.ac.id/ojs/index.php/agribios/article/view/3680

Nurcholis, M., & Supangkat, G. (2011). Pengembangan Integrated Farming System Untuk Pengendalian Alih Fungsi Lahan Pertanian. *Budidaya Pertanian Urgensi Dan Strategi Pengendalian Alih Fungsi Lahan Pertanian*, 71–84. http://repository.unib.ac.id/id/eprint/121

Prajitno, D. (2009). *Sistem Usahatani Terpadu Sebagai Model Pembangunan Pertanian Berkelanjutan di*

Tingkat Petani.

Pusparini, M. D., & Suratha, I. K. (2018). Efektivitas Pengendalian Hama Tikus Pada Tanaman Pertanian Dengan Pemanfaatan Burung Hantu Di Desa Wringinrejo Kecamatan Gambiran Kabupaten Banyuwangi, Provinsi Jawa Timur. *Jurnal Pendidikan Geografi Undiksha*, *6*(2), 54–63. https://doi.org/10.23887/jjpg.v6i2.20683

Rosalina, F., Sukmawati, S., & Febriadi, I. (2021). Sosialisasi Pemanfaatan Limbah Organik Sebagai Upaya Pengurangan Ketergantungan Pupuk Kimia Kepada Kelompok Tani Di Keluarah Majener. *DedikasiMU : Journal of Community Service*, *3*(4), 1190. https://doi.org/10.30587/dedikasimu.v3i4.3258

Saribanon, N., Ilmi, F., Rafsanzani, M. F., Amarullah, A., & Siregar, Z. (2024). Peran Pendampingan Dalam Proses Adopsi Teknologi Pertanian Padi Organik Di Desa Rahayu Kabupaten Tuban Jawa Timur. *Populis : Jurnal Sosial Dan Humaniora*, *9*(1), 79–89. https://doi.org/10.47313/pjsh.v9i1.3662

Soleh, M., Utami, S. N., Juwnda, M., & Khotimah, K. (2022). Analisis Penerapan Sistem Pertanian PadiOrganik Di Kelompok Tani Karep MajuKecamatan Paguyangan, KabupatenBrebes. *Journal of Agribusiness and Community Development (AGRIVASI)*, *2*(1), 156–166. https://doi.org/10.46772/agrivasi.v2i1.848

Sugiyono, S. (2017). *Metode Penelitian Kualitatif, Kuantitatif dan R&D*. CV Alfabeta.

Supyandi, D., Sukayat, Y., & Heryanto, M. A. (2014). Beras Organik: Upaya Meningkatkan Daya Saing Produk Pertanian (Studi Kasus Di Kabupaten Bandung Propinsi Jawa Barat). *Jpfeb Unsoed*, *4*(1), 190–201. https://www.academia.edu/121524961/Beras_Organik_Upaya_Meningkatkan_Daya_Saing_Produk_Pertanian_Studi_Kasus_DI_Kabupaten_Bandung_Propinsi_Jawa_Barat_

Thorat, B. N., Thombre, B. M., & Dadge, A. V. (2015). *B. N. Thorat*, B. M. Thombre and A. V. Dadge*. *33*(2), 653–657. https://www.serialsjournals.com/abstract/77590_91-bn.pdf

Ugwumba, C. O. A., Okoh, R. N., Ike, P. C., Nnabuife, E. L. C., & Orji, E. C. (2010). Integrated Farming System and its Effect on Farm Cash Income in Awka South Agricultural Zone of Anambra State, Nigeria. *J. Agric. & Environ. Sci*, *8*(1), 1–06. https://www.idosi.org/aejaes/jaes8(1)/1.pdf

Walia, S. S., & Kaur, N. (2013). Integrated Farming System - An Ecofriendly Approach for Sustainable Agricultural Environment – A Review. *Greener Journal of Agronomy, Forestry and Horticulture*, *1*(1), 001–011. https://doi.org/10.15580/gjafh.2013.1.071813740

Wardah, E., & Budi, S. (2023). Pemberdayaan Petani Padi Sawah Melalui Pemanfaatan Burung Hantu (Tyto Alba) untuk Pengendalian Hama Tikus (Rattus Argentiventer) di Gampong Pulo Iboh Kecamatan Kuta Makmur. *Jurnal Solusi Masyarakat Dikara*, *3*(1), 12–16.

Wowor, Z. G., Kaunang, R., & Taroreh, M. L. G. (2023). Strategi Pengembangan Usaha Florist Nawanua Flora Di Kelurahan Kakakskasen Tiga Kota Tomohon. *Agri-Sosioekonomi*, *19*(1), 67–76. https://doi.org/10.35791/agrsosek.v19i1.45772