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Strategy development to improve food security at the household level of rice farmers in South Sulawesi Indonesia

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ABSTRACT

Rice farmers are a group of low social capacity people. Though rice production target was achieved but their welfare remains undeveloped. The objectives of this study were to: 1) evaluate determinants of food security; 2) identify sociocultural aspects of households that achieve food security; 3) develop strategies to improve food security of smallholder farmers in Pinrang Regency. This study was conducted, with 50 respondents, in Samaulue Village, Lanrisang District, Pinrang Regency, South Sulawesi Province, Indonesia. This research location is an area with a rice agroecosystem type. The study used qualitative and quantitative approaches (mixed methods), data collection techniques through observation, interviews, and documentation of rice farmers' households. Data analysis uses descriptive qualitative analysis and quantitative analysis. This study concluded that most households in the paddy agroecosystem were categorized as food insecure (66%), while the others were food secure (34%). Among the food security determinant, food availability such as rice production and farmer income were the supporting factors, while food access and food utilization were the hampering factors. In a farmer's household in the rice agro-system, food is one way to express a sense of solidarity, solidarity, and social ties. The study results found that household decision-making patterns tended to show the relatively equal positions of spouses in decision-making. This study proposed four strategies that can be selected by farmer groups. First, improving institutional purchase of production facilities and marketing of agricultural products to create farmers bargaining position (avoiding fluctuations in input prices and output output). Second, improving the quality of products that are oriented toward the local, domestic and international markets. Diversifying main food through preservation of local food resource to anticipate the entry of imported food. Improving the government support on increasing outreach activities and training on marketing strategies for online-based agricultural products (e-marketing).

Key words : Food Security, Consumption quality, Paddy agroecosystem

Introduction

Recently, concern over food security and poverty

alleviation has increased globally in response to several cases of food insecurity and famine in several countries. This effort is stated in Objectives 1 and 2

of the 17 sustainable development goals (SDGs) namely eradicate poverty in all forms everywhere and stop hunger, achieving better food and nutrition security as well as supporting sustainable agriculture. Most poor people in developing countries engage in subsistence farming. They also depend on agriculture both for their incomes and food entitlements. Therefore, agriculture production is the main determinant of household food security, and agriculture plays a crucial role in eradicating poverty and food insecurity in the rural households (Asogwa *et al.*, 2012).

Food security is the condition of the fulfillment of food for the country up to individuals, defined as the availability of sufficient food, both in quantity and quality, that is safe, diverse, nutritious, equitable, affordable, and in compliance with the community's religion, beliefs, and culture, so they can live healthy, active, and productive lives in a sustainable manner. Furthermore, to achieve SDG goals, Indonesia has formulated three strategies and seven indicators to meet all 17 goals, as well as four strategies and four indicators to achieve the second goal.

Household food security essentially refers to households' ability to provide sufficient food. This ability is influenced by many complex factors; generally, it is related to changing aspects of food production, consumption, and resource allocation in the household. The regional level of food security does not necessarily guarantee food security at the household level (Purwantini *et al.*, 2005).

In Indonesia, increasing food security is directed at the independence of the community or farmers, based on local resources, carried out through programs to increase food production; maintain adequate, safe, and halal food availability in each region at all times; and planning to prevent food insecurity. Efforts to improve farmers' welfare can be carried out operationally through the empowerment of counseling, assistance, business guarantees, protection of grain prices, and protection/promotion policies. This is understandable, considering that most Indonesian farmers are still classified as subsistence farmers, in the sense that they act as producers and consumers of rice. Thus, the amount of rice sold to the market will depend on the household consumption surplus, the price of rice, and the price of other goods farmers need from other industries (Darwanto, 2005).

Studies on food security and its handling efforts

have been carried out. For example, research conducted at Kwara State, North-Central Nigeria, shows that 64% of farmers experience food insecurity (Babatunde *et al.*, 2007). Recent research shows that about half of Nigerian rural households (49.4%) were food insecure during the post-planting season (Adepoju *et al.*, 2013). Unfortunately, the incidence of farmer household food insecurity is even higher in urban areas (87.56%). The same thing happened in Ghana, where about 60% of farming households in the Forest Belt, incentral Ghana, were food insecure (Kuwornu *et al.*, 2013). In Ethiopia, almost three quarters of the households (70.7%) had food insecurity (Endale *et al.*, 2014).

In Indonesia, the data indicate that 94.2% of households in Java were either food insecure or had food safety concerns in economic crisis era 1997-1998 (Studdert *et al.* 2001). Even in normal condition, the 2013 National Health Survey reported the prevalence of multiple malnutrition around 11% of Indonesia; some estimates are much higher. This situation dapat juga terjadi pada wilayah center of rice production such as in Bali dan Sulawesi (Suharyanto, 2012).

Indonesia is an archipelago, with various ecological systems and diverse sociocultural environments. Therefore, food policies and interventions must be adapted to these regional conditions. This is in line with the opinion that food policy must be based on ecological areas and use regional resource diversity to prepare food programs more efficiently (Sumarwoto, 1994).

Pinrang Regency, located in South Sulawesi Province, is the center of regional rice production because most of the agroecosystem is dominated by irrigated paddy fields. However, many smallholder farmers are food insecure. The research objectives are: 1) evaluate determinants of food security in Pinrang Regency; 2) identify the sociocultural aspects of households in achieving food security; 3) develop strategies to improve food security of smallholder farmers in the Pinrang Regency.

2 Materials and Methods

This research was conducted in the region of Samaulue Village, Lanrisang District, Pinrang Regency, South Sulawesi, Indonesia. Historically, Pinrang Regency has been one of the centers of rice production in South Sulawesi. The research was conducted from March 2018 to December 2018, us-

ing an exploratory sequential mixed methods approach, to combine qualitative and quantitative data collection and analysis in a sequence of phases. The respondents were selected using a simple random sampling method from the population based on the following criteria: (1) have a complete family unit (husband, wife, children) and (2) be willing to provide information. There were 502 farming households in the village of Samaulue, so by taking 10%, we sampled 50 households.

Data sources were surveyed using a questionnaire, making observations and participating in the respondent's household activities. To complete the survey data, six male farmers (MF) and two female farmers were interviewed in depth to obtain answers and get an overview of household food consumption patterns, decision-making, and household income-expenditure. Furthermore, the respondents' perception data and interview data are used to develop strategies to overcome food security problems. The initial strategy formulation was then discussed in a focus group setting involving farmers and other stakeholders.

Descriptive analysis was used to describe the respondents' sociocultural aspects in achieving household food security and the household members' decision-making roles. Analysis of food security status is determined based on three dimensions: food availability, food accessibility and food utilization. These dimensions consisted of 8 statements as indicators of food security (Table 1).

Status of food security was measured on the basis of one's representation on a five-point continuum of very high, high, moderate, low, not at all.

A weight of 4, 3, 2, 1 and 0 were assigned for very high, high, moderate, low and not at all, respectively. Hence, food security score of a respondent varied from 0 to 32, where 0 to 11 indicated food insecure; 11 to 22 indicated moderate food secure and 22 to 32 indicated highly food secured. However, a Food Security Index (FSI) was also prepared based on the basis of frequency distribution of the respondents on 8 statements of the dimensions of food security.

$$FSI = \{(fVH \times 4) + (fH \times 3) + (fM \times 2) + (fL \times 1) + (fNA \times 0)\} / 1$$

Where, fVH = Frequency of 'very high' opinion
fH = Frequency of 'high' opinion fM = Frequency of 'moderate' opinion fL = Frequency of 'low' opinion and fNA = Frequency of 'not at all' opinion

Thus, total FSI score for 50 respondents could range from $(50 \times 0) = 0$ to $(50 \times 4 \times 8) = 960$

The formulation of the strategy was analyzed by SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. The stages of SWOT analysis were as follows: data collection, data analysis, and decision-making. At the data completion stage, data can be divided into: external data (opportunities and threats) and internal data (strengths and weaknesses). The model used in this stage consists of internal and external factor analysis. Each question item is weighted and scored, with the total weight of each factor being 1.0. Furthermore, the rating is determined based on the level of importance with a scale from 5 (very important) to 0.0 (very not important). The scores are ranked by weight, which leads to an overall score value.

Table 1. Food security dimension, indicator and calculation/formula

Dimension and indicator	Calculation/formula
Food availability	
Rice production (ton/harvest)	Produced by each respondent in a year per hectare
Food from wild source (number of species)	Number of vegetables, fruits, fish from yard or wild sources
Farm household income	Calculated by adding up income from farming activities, income from non-farming activities (alternative income) and income of household members (domestic worker)
Daily food expenditure	Calculated from food expenditure for food groups
Food accessibility market access	Frequency to get food from market per month
Government aid	Frequency of aid per year
Social aid	Frequency of aid per year
Food utilisation	
Food consumption score	Data of actual consumption were Calculated from food sources (main food, protein, vegetable, fruit, and milk). These were compared to the amount required (standard) and score from 0 to 2, then all sources were added.

Results

Characteristics of Respondents

The socioeconomic characteristics of Samaulue Village's respondents include age, education, knowledge of nutrition and food, farming experience, and the number of household members, are shown in Table 2 below. Based on the data, most respondents were 27–46 years old (56%); 38% of respondents had an elementary school education level; and 44% have good knowledge of nutrition and food.

Table 2. Socioeconomic Characteristics of Respondents in Samaulue Village, Lanrisang District Pinrang Regency South Sulawesi Province, 2018.

Characteristics	N (%)	
Age (year)	27–46	56
	47–66	44
Gender	Male	90
	Female	10
Education	Elementary School	38
	Junior High School	22
	Senior High School	34
	Bachelor	6
Knowledge of nutrition and food	Low	28
	Medium	28
	High	44
Experience of cultivation	< 17 years	58
	≥ 17 years	42
Rice field width	Minimum (ha)	0.5
	Maximum (ha)	2
	Average (ha)	1.03

Source: Analysis of primary data, 2018

Food availability

Food availability, was determined by rice production, food from environment (from farm or yard) farm household income, and daily food expenditure. The amount of production produced by farm households show the ability of households to provide food. A total of 80% respondent had low to moderate food production, while 20% had high to very high of it (Fig. 1). The average production level of respondents during the two growing seasons, namely in the first planting season, was 7,033.32 kg with a productivity of 5,410.25 kg per ha. In the second growing season, production was 7,553.33, and productivity was 5.964.1 kg per ha. The average production for the two growing seasons was 5,687 kg per ha. The respondents' overall

production level was still lower than the average district production level (5,888 kg per ha). When production does not meet food needs, farmers look for alternative foods from yards and wild sources including tubers, fruits, and fishes.

Household income is derived from overall income of the head of the family as a farmer, income from activities other than farming (alternative work), and income from family members who work. Household income is categorized into five criteria. The data showed that 76% of respondents included in the low to moderate income category, while 24% had high to very high income. The farmer daily food expenditure was categorized as low (46%), moderate (46%), and high (8%) (Fig.1).

Food accessibility

People's behaviour patterns in meeting their food needs are influenced by customs or habits. There are times when customs or habits become a barrier to developing and changing the culture itself. Every social change always includes cultural change, and cultural change includes social change. This study showed that household access to market was considered as low and moderate, while their access to aid both from government and community was considered as none or low. The farmer access to market was categorized as none (4%) low (38%), moderate (34%), high (22%), very high (2%). Their access to government aid was categorized as none (46%) low (52%), moderate (2%), while those from community aid was categorized as none (66%) and low (34%) (Fig. 1).

Market distance and food availability will support the fulfillment of family supplies and food needs. Social access to food consists of food aid and food bartering. Food assistance refers to getting government aid in the form of rice assistance or other basic food items. Food meant for bartering is to provide and receive food among community members (neighbors, and relatives or family).

Food utilization

The purpose of food consumption is to obtain the nutrients the body needs. In general, the types of food consumed by farm households are less varied, namely only two types of staple foods (rice and corn). The other main foods, such as cassava and sweet potatoes, were only consumed as snacks. The types of side dishes respondents and their families consume are animal side dishes (fish and eggs) and

vegetable side dishes (tofu and tempeh). Furthermore, the types of vegetables consumed by the respondent's household are spinach, kale, long beans, and eggplant. There were only two types of fruits consumed by respondents, namely bananas and papaya. None of the respondents consumed milk (Table 3). Based on the data, the farmer food utilization was categorized as low (44%), moderate (48%), and high (8%) (Fig. 1).

Sociocultural Aspects of Households in Realizing Food Security

For some respondents, besides having a primary function, food should also fulfill a secondary function that is to have a good appearance and taste. However, consumers will reject foods, even those with high nutritional content, if their appearance

and flavor are unattractive and do not meet consumers' tastes. That is why food quality must always be maintained because it is an important factor in determining whether a food ingredient will be accepted or not by consumers.

Food consumption habits are ways in which individuals or groups of people choose, consume, and use available foodstuffs based on their sociocultural background. Eating habits in a community are part of a culture that has been maintained and developed from generation to generation. This pattern influences the way people choose materials and types of food that must be produced, processed, distributed, and prepared until served. The types of commodities produced by farmers in rice field agroecosystems were rice, corn, cassava, sweet potato, water spinach, spinach, cowpea, eggplant,

Table 3. Average Food Consumption in Respondent Households in Pinrang Regency, South Sulawesi

Type of food	Average of consumption per person (gram/person/day)	National standard of consumption (gram/person/day)
Rice	255.37	500
Fish/meat	229.74	200
Vegetables	129.03	150
Fruits	55.54	200
Milks	0	25

Source: Primary Data Analysis, 2018

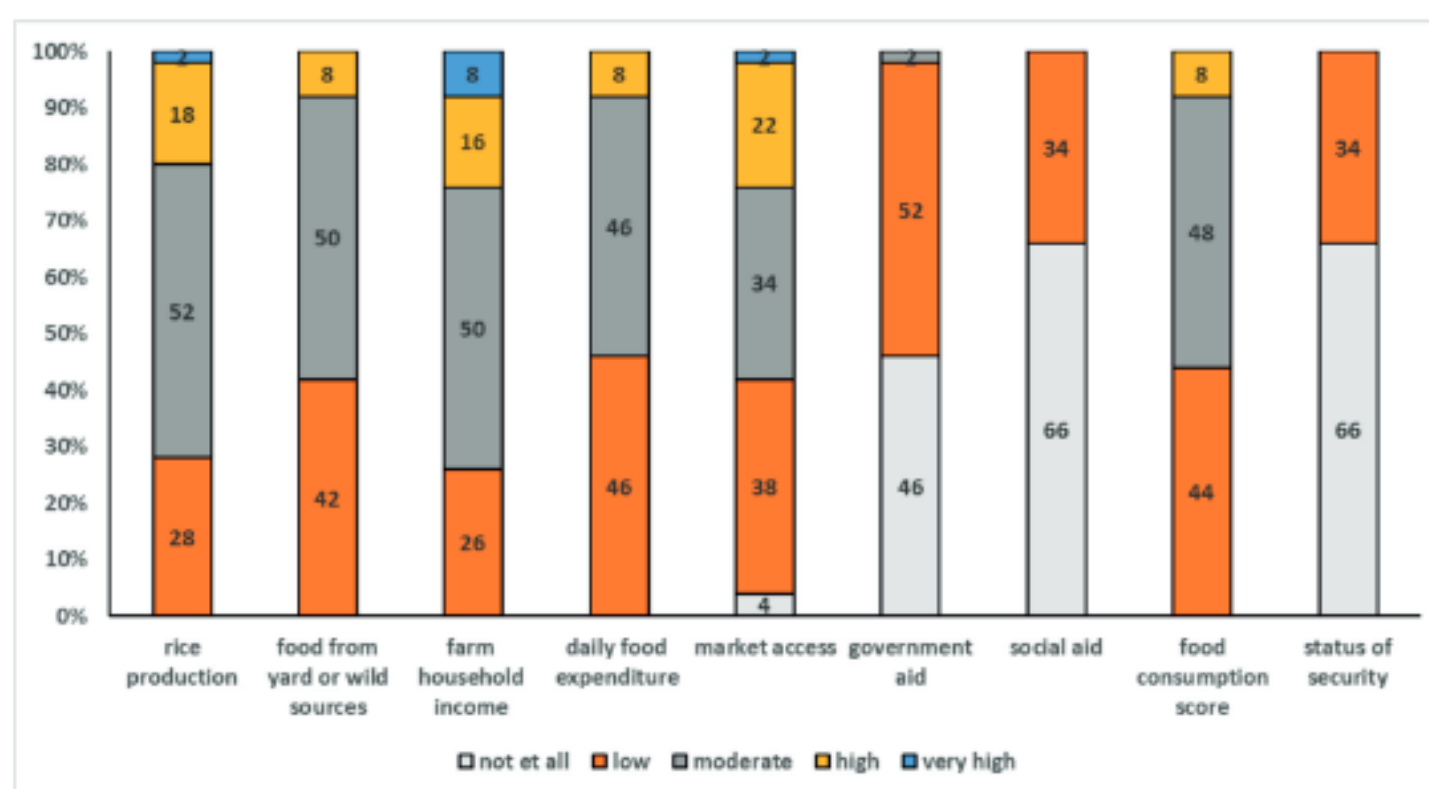


Fig. 1. Score of 8 indicator of food security of household farmer in Pinrang Regency, South Sulawesi
Based on the data, this study showed that 66% of households were categorized as food insecure (the score ranged from 0 – 1.33), while 34% was categorized as moderate food secure.

banana, and papaya. Our data showed that rice production, food from yard and wild sources, farmers' income was considered moderate, however in general 66% of farmers were classified as food insecure. This is due to several factors, one of which was consumption behavior. One informant explained as follows

"Farmers generally apply strict expenditure for food consumption, generally they save money to anticipate the famine. In addition, farmers also prioritize spending on children's education" (MF 1, interviewed on May 26, 2019).

The diversity of food consumption is also affected by the environment, sociocultural factors, and hereditary eating habits, causing diverse tastes. Food consumption patterns of a region's people are generally formed due to the availability of food derived from plants from outside the area that can easily adapt and grow well in the land available for production.

"Food consumption is not only a food maintaining the health, but also has social values. This has implications for strengthening and expressing social solidarity and strengthening social ties in social life. (MF 1, interviewed on May 26, 2019)."

The above statement was supported by another informant, who said that

"Food is one of the media to express a sense of solidarity, brotherhood, and source of social cohesion. Food serves as a means to establish social relations. Offering food is offering affection, attention, and friendship. (MF 2, interviewed on May 28, 2019)."

Another informant explained that

"We rarely get aid from the government and community in the form of cash assistance, incentives or other such as donations and charity, therefore we must be able to help one another. (FF 1, interviewed on May 29, 2019)."

Receiving offered food involves acknowledging and accepting the feelings expressed, and at the same time, as a symbol between those who give and those who receive food, that they have established a reciprocal relationship. Mutual reciprocity in giving and receiving food, offered both in neighboring relationships and when holding activities or events, is familiar, as the results of the following interview indicate.

"In this village (Samaulue Village), the community members have a habit of doing activities such as giving food to neighbors and relatives. If you

have excess food or food items, usually share with neighbors or family. In the month of fasting (Ramadhan) the habit of the community to give each other food or snacks to break their fast to neighbors or family, also to the mosque. This has become a tradition in this village." (MF 3, interviewed May 29, 2019).

Someone who, on a certain day, makes food always offers some to neighbors, relatives, or nearby people. Food is also a manifestation of human tolerance, from processing raw materials to preparing food. How food is presented and consumed is a tradition. The interrelated relationships among socio-cultural factors, such as religious life, will promote that tolerance.

The Role of Household Members in Decision-Making

This study's results found that household decision-making patterns tended to show the relatively equal positions of spouses in decision-making. The women decided their household tasks independently; especially kitchen management and menu selection (100%), household financial management (80%), and household need management (75%), while other activities were more balanced (Fig. 2).

The data from questionnaires supported this observation, as shown in this interview.

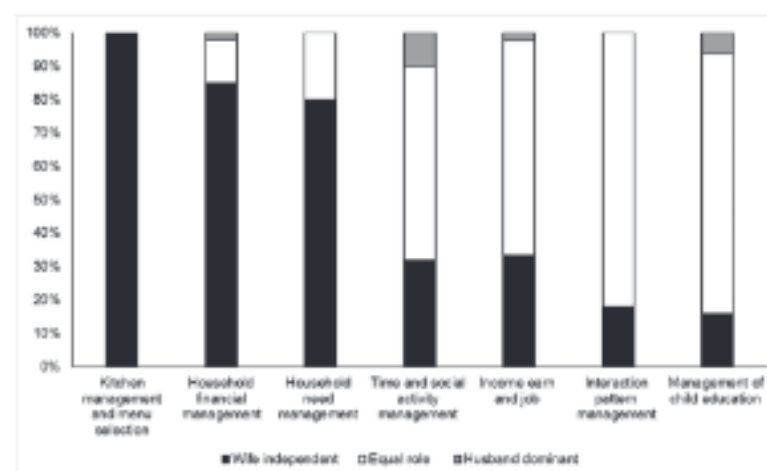


Fig. 2. Role of spouse in household decision-making

"All matters in the household and children are my responsibility and authority. I always make decisions ranging from work in the kitchen, shopping affairs, food affairs, financial affairs, education or school matters to children, home care, and maintenance to other needs. In certain matters I also always try to discuss it with my husband first before making a decision (*sipakarajaki mallabineng*) such as children's education costs, buying household equip-

ment or other matters (social interaction) such as family invitations, sick families, and others" (FF2, interview 27 May 2019)

(Note: *Sipakarajaki mallabineng*: the language of the Bugis tribe in South Sulawesi whose meaning is "mutual respect between husband and wife")

The results of the SWOT analysis showed that the farmers have internal strengths, including having strong social relations, using their yards to grow vegetables and fruits, and having a strong pattern of family decision-making with support from the agricultural office and related agencies. Meanwhile, their internal weaknesses included: Lack of creativity to diversify agricultural products and animal husbandry; narrow land and sharecroppers; undeveloped farming technology; weak institutional management, facilities, and infrastructure; decreased land productivity and the younger generation's declining interest in farming. The inter-

nal factors analysis summary (IFAS) matrix analysis showed that the total score for internal strength was 1.88, while that of internal weakness was 0.96. Therefore, the total internal score was 0.70 (Table 4).

External opportunities include: government support for rice farming; increasing demand for rice; and the existence of service institutions. External threats include: fluctuating prices of production input and output; a trading system that does not favor farmers; climate change and competition from imported products. The external factors analysis summary (EFAS) matrix analysis showed that the total score for external opportunities was 1.2, while that of external threat was 1.7. Therefore, the total internal score was "0.50 (Table 5).

Based on the results of IFAS and EFAS matrix analysis and plotting in the vent diagram, the value fell on quadrant II. That meant the appropriate strategy in this situation was diversification (Figure 3).

Table 4. Internal Factors Analysis Summary (IFAS) matrix

No	Internal factor	Weight	Score	W x S
1	Practice strong social relations	0.11	4.0	0.44
2	The farmers use their yards to grow vegetables and fruits	0.15	3.5	0.52
3	Have a strong pattern of family decision-making	0.04	3.0	0.11
4	Support from agricultural office and related agencies			
	Total internal strength	0.45	14.5	1.66
	Weaknesses			
1	Lack of creativity to diversify agricultural products and animal husbandry	0.15	2.5	0.37
2	Generally, have narrow land and sharecroppers	0.07	1.5	0.11
3	Farming technology is not developing	0.11	2.0	0.22
4	Weak institutional management, facilities, and infrastructure	0.11	1.5	0.17
5	Decreased land productivity	0.07	1.0	0.07
6	The younger generation's declining interest in farming	0.04	0.5	0.02
	Total internal weaknesses	0.55	9	0.96
	Strengths–Weaknesses score			0.70

Table 5. External Factors Analysis Summary (EFAS) matrix

No	External opportunities	Weight	Score	W x S
1	Support from government on rice farming	0.15	3	0.45
2	Increasing demand for rice	0.15	3	0.45
3	The existence of service institutions	0.15	2	0.3
	Total of external opportunities	0.45	6	1.2
	External threats			
1	Fluctuations in the prices of production input and output	0.15	3	0.45
2	Trading system that does not favor farmers	0.1	2	0.2
3	Climate change	0.15	3	0.45
4	Imported products	0.15	4	0.6
	Total external threats	0.55	14	1.70
	Opportunity–Threat score			–0.50

Therefore, Strength Threat Strategy options were discussed first, followed by Strength Opportunity, Weakness Opportunity, and at least Weakness Threat options are analyzed (Table 6).

ST-strategies

Farmer groups could choose four strategies. First, the institution's purchase of production facilities and government support on marketing of agricultural products to improve farmers' bargaining position. This can be done through farmer groups or cooperatives. This aims to avoid fluctuations in input prices and output. This activity includes purchasing seeds, fertilizers and pesticides need to be institutionalized. For example, through groups of farmers who become intermediaries to make it easier for farmers in finding markets. It is hoped that farmer groups can become business institutions

or business groups that connect farmers to markets (increasing the role of farmer groups). Second, improve the quality of products that are oriented toward the local, domestic, and international markets.

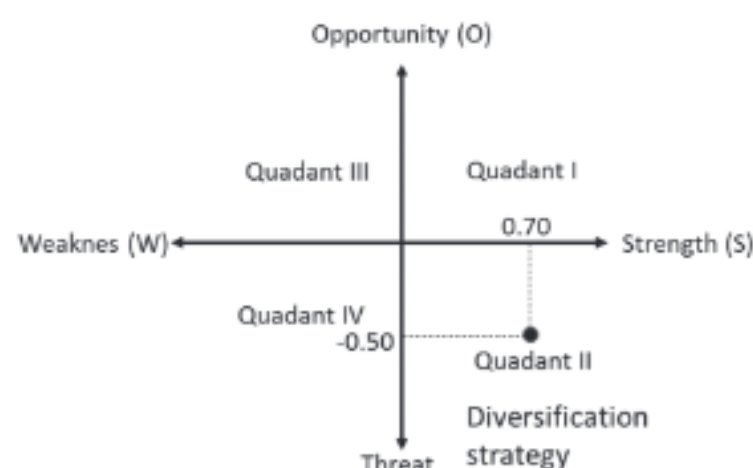


Fig. 3. Position of appropriate strategy to develop an organic farming system

Table 6. SWOT strategy matrix for developing the organic farming system

Factors	Internal Strength	Internal Weaknesses
External opportunity	Improve government support to strengthen farmer institutions (S1-O1). Diversification of local food source consumption using a yard or wild source while maintaining the productivity of paddy fields as a center for rice production. (S2-O2) Increasing the professionalism and performance of agricultural instructors to motivate farmers to improve the productivity of paddy fields by applying the right rice cultivation techniques. (S4-O2)	Increasing the creativity of farmers by using family resources (diversifying agricultural and livestock products) commercial cassava and sweet potato planting as local food products through government support. (W1-O1) Intensification of paddy fields and revision of production sharing systems to increase rice production and household food security. (W2-O2) Conduct training and assistance to the mastery of sustainable agricultural technology based on local resources (comparative advantage) toward competitive advantage through government support (W3-O1)
External threat	Improving institutional purchase of production facilities and marketing of agricultural products to create farmers bargaining position (avoiding fluctuations in input prices and output output). (S1-T1) Improving the quality of products that are oriented toward the local, domestic and international markets. (S2-T1) Diversifying main food through preservation of local food to anticipate the entry of imported food. (S4-T4) Improving the government support on increasing outreach activities and training on marketing strategies for online-based agricultural products (e-marketing). (S4-T2)	Diversification of agricultural products and using the potential that is owned by growing food crops other than rice and corn, namely cassava and sweet potatoes commercially to avoid the fluctuations in the price of input and output. (W1-T1) Diversification of local food products by using the yard to plant other types of food crops besides rice and corn, namely cassava and sweet potatoes commercially and utilizing e-marketing. (W2-T2) The government is giving reinforcement to farmers and farmer groups regarding crop management patterns, high adapted production facilities to climate change, and environmentally friendly cultivation techniques to anticipate climate change. (W4-T3)

Production quality, for example, farmers do postharvest in accordance with market standards (local, domestic and international) given the competition of products from other countries is also getting tougher (the flow of commodity products from outside into Indonesia). Therefore, diversification of agricultural products needs to be increased so that it does not only rely on rice alone. Third, the government needs to socialize and preserve local food products to anticipate the entry of imported food. Government policy or support through local food development programs is needed so that the community can further empower its local potential as a source of carbohydrates, for example from tubers. Fourth, increase counseling activities and training on marketing strategies for online-based agricultural products (e-marketing). specifically, for both farmer dan their counselor, it is necessary to digitize literacy, one way to help farmers in marketing in collaboration with farmer groups (through farmer institutions) so that farmers have no difficulty in accessing markets.

SO-strategies

The SO strategy can enforce farmers' strength and use opportunities. This study proposed three strategies as follows. First, use government support to strengthen farmer institutions. So far, cooperative farming institutions have a weak role. Therefore, with government intervention, this institution can be empowered. Second, it is necessary to diversify local food consumption source through using a yard or wild source while maintaining the productivity of paddy fields as a center for rice production. There are several local food sources that enable farmer to get access from yard or wild source such as tubers, fruits, and fishes. Third, increasing agricultural instructors' professionalism and performance will motivate farmers to increase the productivity of paddy fields by applying the right rice cultivation techniques.

WO-strategies

The form of WO strategy that can be an option: First, increase farmers' creativity by using family resources (diversifying agricultural and livestock products) to grow commercial cassava and sweet potatoes as local food products. Second, intensification of paddy fields and revision of production sharing systems will increase rice production and household food security. Third, conduct training

and assistance for mastering sustainable agricultural technology based on local resources (comparative advantage) toward competitive advantage through government support.

WT-strategies

The choice of the last form of strategy is the WT strategy. The strategy that can be chosen is to diversify agricultural products and by growing food crops other than rice and corn, namely cassava and sweet potatoes, commercially to avoid the occurrence of fluctuations in input prices and output. With this strategy choice, farmers are not too dependent on a single product, so alternative crops can support food security.

Discussion

Our study illustrated that most households in Samaulue Village (68.0%) are food insecure. This condition seems quite ironic, considering that Pinrang Regency is one of the food storage areas, especially rice in South Sulawesi. This is in line with the opinion that, although food security is guaranteed at the regional level, it is not enough to guarantee food security at the household level. Food security at the household level refers to households' ability to meet their food needs. This ability is influenced by many very complex factors; generally, it is related to changes in aspects of food production, consumption, and resource allocation in the family (Purwatini *et al.*, 2005).

Household food security is linked to families' ability to meet the demands of all its members (Usfar, 2012). This implies physical and economic access to food that is sufficient in quantity and quality of nutrition as well as safety and acceptability to local culture to meet the needs of every family member. Household access to food is a strategy for getting food from various sources. Food for the household can come from several sources, including: self-producing, buying, or receiving gifts. Individual access to food is strongly influenced by purchasing power, income levels, food prices, food distribution processes, institutions at the local level, and other social factors. In meeting the family's food needs, farmers in the rice agroecosystem use of their own production. When they want to consume other types of food, they do not produce themselves, they buy it from markets or stalls in the surrounding environment.

The patterns and habits of food consumption are related to economic aspects. Income is the main factor in determining the quality and quantity of food ingredients. Families with higher income levels tend to choose better quality and quantity of foods. Low-income households were generally less able to meet their food needs (Ayiek, 2008). This condition makes some farming households in rice farming agroecosystems choose food that is cheap and easily available for consumption.

Through a theoretical approach to the distribution of power, decision-making patterns in several aspects of household life include production, consumption, and formation of the family and social activities carried out by the husband and wife (Levy, 1991).

Power is defined as the ability to influence others who may or may not have the same values. Based on these thoughts, five types of decision-making are explained, namely (Pujiwati, 1987):

1. Decision-making is done by the wife herself
2. Made together, but the wife is more influential or dominant
3. Joint and equal decision-making
4. Made together, but the husband is more influential or dominant
5. Decision-making is done by the husband himself.

In the case of this study, husband and wife decision-making refers to the thoughts of Pujiwati (Prihatin *et al.*, 2012) as mentioned above, covering 7 (seven) main areas, namely: 1) Managing kitchen matters, 2) Managing family finances, 3) Managing various needs, 4) Managing time and activities outside the home, 5) Living, 6) Managing interaction patterns, and 7) Managing children's education.

According to Bulqis (2012) (Endale *et al.*, 2014), there is a tendency for appropriateness factors to influence social activities. At ceremonial events, such as weddings, wives or female household members help more because the activities carried out relate to what is often done by women such as cooking, preparing dishes, and arranging food menus.

This study proposed four strategies that can be selected by farmer groups. First, purchase of production facilities and government marketing of agricultural products improves farmers' bargaining positions. Second, farmers and stakeholders collaborate to improve the quality of products oriented to the local, domestic, and international markets. Third, farmers must preserve local food products to

anticipate the entry of imported food. Fourth, increase counseling and training activities on marketing strategies for online-based agricultural products (e-marketing).

Strategies to develop food production and availability can be done by increasing and maintaining production capacity, accelerating the production of unconventional food ingredients and developing technology to increase business productivity (Sunyoto, 2004). Optimal food production, in addition to meeting the availability of household food, can also control the level of imports in the food sector. This provides opportunities for farmers to improve family welfare and support the creation of national food security (Prihatin *et al.*, 2012).

Another study agrees that one way to improve self-efficiency is to promote increased agricultural productivity. Imports can be reduced by increasing agricultural output without raising domestic food prices. Other important efforts are to increase self-sufficiency on the one hand and food security and poverty reduction on the other. Unfortunately, Indonesia's commitment to increased agricultural productivity seems to be declining. Finally, Indonesia has demonstrated that practical mechanisms can be designed to protect poor consumers from potentially dangerous prices, by designing a conditional subsidy system (Clapp, 2017).

Other studies have shown that agroforestry yard and land empowerment strongly support community food security. This happens through the mechanism of increasing income from products sold and reducing expenses from the use of local food plants. Agroforestry is an effective way for equity and stages to overcome poverty in the forest village community environment, which can increase income and food production (Indartato *et al.*, 2019). The farmer school approach has been reviewed and demonstrated that community participatory processes can create conditions conducive to empowering small farmers to identify their rice production problems and opportunities related to access to technical and financial support in the area of nursery preparation and irrigation, including pest control and disease and plant marketing (Rugumanu, 2014).

Conclusion

This study concluded that most households in the paddy agroecosystem were categorized as food in-

secure (66%), while the others were food secure (34%). Among the food security determinant, food availability such as rice production and farmer income were the supporting factors, while food access and food utilization were the hampering factors. In a farmer's household in the rice agro-system, food is one way to express a sense of solidarity, solidarity, and social ties. The study results found that household decision-making patterns tended to show the relatively equal positions of spouses in decision-making. This study proposed four strategies that can be selected by farmer groups. First, improving institutional purchase of production facilities and marketing of agricultural products to create farmers bargaining position (avoiding fluctuations in input prices and output output). Second, improving the quality of products that are oriented toward the local, domestic and international markets. Diversifying main food through preservation of local food resource to anticipate the entry of imported food. Improving the government support on increasing outreach activities and training on marketing strategies for online-based agricultural products (e-marketing).

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