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Author's Affiliation:

1. Agribusiness Study Program,
Faculty of Agriculture,
Universitas Muslim - Indonesia
2. Agribusiness Study Program,
Faculty of Agriculture, Animal
Husbandry, and Fisheries,
Universitas Muhammadiyah
Parepare - Indonesia
3. Department of Socio
Economic, Faculty of Animal
Husbandry, Universitas
Hasanuddin - Indonesia

*Corresponding Author:

Ida Rosada
Email:
ida.rosada@umi.ac.id

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Enhancing Indigenous Knowledge to Enhance Food Security in Rice Field Agroecosystems of Pinrang Regency, South Sulawesi Province, Indonesia

Ida Rosada^{1*}, Nurliani¹, Farizah Dhaifina Amran¹, Nurhapsa², Sitti Nurani Sirajuddin³

Abstract

Background: The traditional agricultural system is a cultivation system that has been passed down from generation to generation so that it becomes the local knowledge of farmers in carrying out cultivation activities. Traditional agriculture in Samaulue Village still maintains local wisdom. In the life of the community, there are social values that form local wisdom and have become part of everyday life.

Methods: The ⁵population in this study were all farmer households in Samaulue Village. The number of research samples was 50 rice farmer households. The method of determining the sample using a simple random sampling. The analytical method used in exploring the potential for local wisdom values in supporting food security is a qualitative descriptive method and Focus Group Discussion (FGD). This research is a qualitative research.

Results: There are three forms of local wisdom that were carried out before planting, three during the provision of seeds and the initial planting, and the traditions before harvest and harvest that are still being carried out are two. The dimensions of food security from the aspect of food availability, people rely on the availability of food that comes from their land, buying at local markets or rice selling kiosks or at rice mills in their area; in terms of food access, the main food needs of the families are fulfilled from agricultural products, while for additional food needs and daily needs are available in stalls or shops and kiosks; lastly for the food absorption dimension, the families underwent a pattern of eating three times a day.

Conclusion: Local wisdom which refers to local culture in rice farming production activities includes: *tudang sipulung*, *mappalili* and *mappammula* (pre-planting activities), *mampo* and *mappammula mattaneng* (seed provision and initial planting activities). The form of local wisdom is preparing food reserves in the household because the tradition of *mappatala* (eating together), *pamali* (not allowed) to empty the rice container (*pabbarassengeng*) in the house and has brought the rice field agro-ecosystem community never experiencing hunger, even though there is a scarcity of rice.

Introduction

Agriculture sector plays a crucial role in economic development for many countries. Many parties are trying to develop this sector in many ways. In developing agriculture, considering the food production only is not enough, there are farmers who need to be considered when people want to develop agriculture sector, like how farmers live, how farmers are doing farming etc. It is a holistic thinking in developing agriculture. Future challenges in agriculture will become all parties' responsibility [1,2].

Agriculture is one of the main components in sustaining life. Agriculture has an important role, one of which is as a provider of food needs that are needed by the community to ensure food security. The higher the growth of the human population, the higher the need for food. Household food security is one of the important levels because even though an area is categorized as food secure, food security does not necessarily reach the household level [3]. According to [4], this is because food security is influenced by 2 main factors, namely availability and accessibility.

In agricultural activities, there are two types of cultivation systems, namely traditional agricultural systems or also known as traditional cultivation and modern agricultural systems. The traditional cultivation system is a cultivation system that has been passed down from generation to generation so that it becomes the local knowledge of farmers in carrying out cultivation activities. This local knowledge system gives us an overview of the wisdom of community traditions in utilizing natural and social resources wisely with reference to the balance and sustainability of the environment.

Traditional agriculture that has developed in the community over the years should be able to conclude that by using this system, traditional farming communities have succeeded in providing food for one generation of farmers to the next. Local wisdom is the most important aspect of traditional farming systems. Local wisdom is often interpreted as local knowledge, which contains knowledge and various strategies in answering various problems related to the environment, meeting food needs, and community adaptation strategies in the face of changes in the natural and social environment.

The agricultural sector is a leading sector in South Sulawesi Province, especially in Pinrang Regency. One of the prominent agricultural subsectors is food crops, namely rice. Based on data from [5], Pinrang District has a potential rice paddy area of $\pm 44,861$ Ha (22.87% of Pinrang district area), with rice production of 625,312 tons or about 4.89 percent of the total rice production of South Sulawesi Province.

Samaulue Village is one of the villages that has the highest rice production and productivity in Lanrisang Sub-district. This is because many wet-rice farmers have been cultivating modern (advanced) and semi-modern wet-rice; with the development of the times, rice farming has developed from traditional farming to advanced (modern) farming. Traditional agriculture in Samaulue Village still maintains local wisdom. In the life of the community, there are social values that form local wisdom and have become part of everyday life.

Local wisdom is defined as the wisdom or knowledge possessed by a community in order to manage the environment, namely knowledge that gives birth to behavior as a result of their adaptation to the environment, the implication of which is the sustainability and continuity of the environment for the long term [6]. Local wisdom [7] becomes a potential energy and strength that can guide the community to develop a set of activities that meet the needs of life that still respond to the conditions of the natural environment. Acting locally in anthropological terms is often juxtaposed with activities to understand and preserve local wisdom [8].

In agriculture, indigenous knowledge can be in the form of knowledge about farming systems and crop production, such as the right time for preparation, planting and harvesting; tillage practices, plant propagation methods; seed processing and storage; cropping, harvesting and storage practices; food processing and marketing; crop pest management systems and crop protection methods [9].

Local wisdom refers to the knowledge that comes from the community's experiences and the accumulation of local knowledge [10]. In rural areas, local wisdom has become the part of people life. Farmers as people who dominate the livelihood involving local wisdom in their farming activities. Local communities are meeting the challenge that people are struggling to choose protecting environment through local wisdom or losing environment for economic benefit [11].

Agriculture, especially rice production, is a field of life that contains a lot of local wisdom. All rice production processes, pre-harvest and post-harvest, utilize traditional techniques that contain local values, norms and wisdom. But after the introduction of post-harvest rice technology, local wisdom was slowly shifted, and people almost forgot about it. The reason is because technology makes all work easier, in a short time and increases rice production. This certainly should not be allowed, because local wisdom is an instrument that makes the Indonesian nation known as a nation that gets along well and respects the culture of its people. So, it is necessary to conduct research on local wisdom in the production and consumption activities of farmers in Pinrang Regency, South Sulawesi Province, Indonesia.

6 Methods

The research was carried out in Samaulue Village, Lanrisang District, Pinrang Regency. The determination of the research location was carried out purposively with the consideration that the area is a rice field agroecosystem type area and generally the livelihoods of the community are farmers.

The population in this study were all farmer households in Samaulue Village. According to [12] if the population is >100 and homogeneous, a sample of 10-15% of the population can be taken. There are 502 farmers in Samaulue Village, so by taking 10%, the number of research samples is 50 households of wet-rice farmers. The sampling method used simple random sampling. The research took place from June to August 2021. The analysis method used in exploring the potential of local wisdom values in supporting food security is descriptive qualitative method and Focus Group Discussion (FGD). This research is qualitative research. The data/information obtained as material for analysis is the main data and information in this study are respondents. Data collection methods through interviews, observation and documentation. In this study, researchers captured information using an interview guide (questionnaire) in the form of questions that researchers had prepared beforehand.

Data analysis used a qualitative descriptive analysis method with an interactive model as proposed by [13]. This model consists of three main things, namely data reduction, data presentation and conclusion drawing/verification. These three things are intertwined during and after data collection is carried out, so that it seems to form an interactive cycle.

Results

Respondents' Characteristics

The identity of a farmer is important to know in order to give an idea of how long he has worked in agriculture. Respondents in this study were farmers who cultivated wet-rice crops. The identity observed includes age, education level, farming experience, number of family dependents, land area and alternative occupation. The identity of the respondents is shown in Table 1.

Local Wisdom in Rice Farming Production System

Local wisdom commonly had been obtained from previous generations and being practice daily [14]. How those local wisdom had born still become a secret, but people believe that what their ancestors were doing is correct and need to be preserved. In some programs, from government or other parties, local wisdom plays important role to make the program success [15]. To make the local wisdom can be useful for any program,

the local wisdom needs to be learnt with global perspectives [16,17].

No	Characteristics of Respondents	Frequency (people)	Percentage (%)
1.	Age (Year): a. 20 - 37 b. 38 - 55 c. 56 - 72	13 27 10	26 54 20
2.	Level of Education a. Never went to school b. Elementary c. Junior high school	15 17 18	30 34 36
3.	Farming Experience (Year): a. 1 - 17 b. 18 - 35 c. 36 - 50	26 15 9	52 30 18
4.	Number of Family Dependents (Person) a. 0 - 1 b. 2 - 3	10 40	20 8

Source: Primary Data, 2021

Table 1: Characteristics of Respondent Households in Samaulue Village, Lanrisang Sub-district, Pinrang District, South Sulawesi, Indonesia.

Local wisdom is a view of life and science as well as various life strategies in the form of activities carried out by local communities in answering various problems in meeting their needs. In foreign languages, it is often conceptualized as local wisdom or local knowledge or local genius. Local wisdom or environmental wisdom has existed in people's lives since ancient times until now. Local wisdom in agriculture is not only concerned with food yields, but also with maintaining the health of the surrounding environment [18].

Local wisdom in rice farming is practiced by rice farmers in Samaulue Village, Lanrisang Subdistrict, Pinrang Regency from pre-planting to harvesting activities. The farming community of Samaulue Village has a special knowledge system that is used to carry out farming starting from the preparation stage to the harvest stage.

Local Wisdom Before Planting	Information
• Tudang sipulung	Still done
• Mappalili	Still done
• Mappamula	Still done
Provision of Seeds and Initial Planting	Information
• Maddoja bine	Are not done
• Mampo	Still done
• Mappamula mattaneng	Still done
Reaping Ceremony (Harvest)	Information
• Mappasoro	Still done
• Mappadandang	Still done

Source: Primary data analysis, 2021

Table 2: Local Wisdom in Production Activities of Rice in Samaulue Village, Lanrisang District, Pinrang Regency.

Local Wisdom in Consumption Activities

In terms of household consumption, farmers in rural areas are also familiar with various local wisdoms, starting from the stage of selecting food ingredients to serving/serving it to all family members. Local wisdom in family consumption have existed for long time in

Indonesia, the country is known to have various beneficial habits related to consuming healthy food [19]. Various kinds of local wisdom exist in rural communities, especially in Samaulue Village, which are still carried out by housewives in supporting household consumption activities.

Aspects of food security and local wisdom	FGD results
1. Food Availability	- The staple food of rural communities is dominated by rice, sometimes using glutinous rice which is often processed into 'Sokko' for certain traditional events or activities. - Staple food comes from land that belongs to the community, which is deliberately stored in private barns in each other's homes. - Staple foods are also sometimes purchased at local markets and kiosks or mills. - Another source of food availability is livestock. The majority of people in Samaulue Village have cattle, cows, goats and chickens.
2. Food Access	The main food needs of the families of Samaulue Village residents are met from agricultural products, while additional food needs and daily needs are available in stalls or shops and kiosks in the village and there is 1 local market in Samaulue Village
3. Food Absorption	- Eating pattern 3 times a day - When consuming food, the community consumes rice, vegetables and fish as side dishes. For fruits, people consume bananas, papayas, and sometimes watermelons. - In general, the people in Samaulue Village do not experience problems in procuring food. Either from agricultural products, or their income from livestock and other economic activities is sufficient to meet their family's food needs. - Consumption of food other than the staple food, which is rice, farmers' families in Samaulue Village also consume food which is a side dish that can replace rice. Side dishes that are sometimes consumed by the people are <i>Pule Warelle</i> (mashed and steamed corn like rice and topped with grated coconut) and <i>Pule Utti</i> (pureed and steamed young bananas and topped with grated coconut) and tubers.
4. Examples of local wisdom in fulfilling food security (production, distribution and consumption stages)	- It is not permissible (<i>pamali</i>) to take rice from the rice storage area to give to others. Because it can be difficult later in providing food for the household - The rice storage area cannot be empty (<i>denawedding kosong pabbaressengngeng</i>) Notes: <i>Pabbaressengngeng</i>: storage place rice in the house <i>Mappatala</i> Tradition (eating together) - Not allowed to leave food (no food left) - When eating, food should not be scattered

Source: Primary data analysis, 2021

Table 3: Results of Discussion of Focus Group Discussion (FGD) Activities, Various Local Wisdoms on Household Consumption Aspects of Rice Field Agroecosystems in Supporting Household Food Security, in Samaulue Village, Lanrisang District, Pinrang Regency, 2021.

Discussion

Table 1 shows that the age of respondents is generally between 20 and 55 years old (80%). This shows that the age of respondents is generally still classified as productive age. In addition, the results of research conducted by [20] showed that in general, younger and healthier farmers have strong physical abilities and more quickly accept new things that are recommended, this is because younger farmers are more willing to take risks. The results of the study are in line with the opinion of [21] that the productive age in farming is the age between 15-50 years. Furthermore, [22] found that the young generation does not appreciate about the function contained in a tradition including local wisdom.

The level of education is one of the factors that has a considerable influence on the ability of farmers to absorb or receive information. Generally, the education level of respondent households in the research location is elementary school and high school (70%). This shows that the average education of farmers in the study area is still low so that it will affect the absorption of information. In this study area, farmers obtained non-formal education through agricultural extension activities and the formation of farmer groups. The active role of non-formal education causes farmers to accept new technology provided by the government through agricultural extension workers (PPL). This is in line with the purpose of agricultural extension as a means of providing knowledge, improving skills and changing farmers' attitudes in farming [23].

In addition to education, farming experience also affects the success of farming. The longest experience of paddy rice farming in the study area was in the range of 1-17 years as many as 26 people (59%), 18-35 years as many as 15 people (30%) and 36-50 as many as 9 people (18%). The average experience of respondents in rice farming is 21 years. Experience shows the level of interaction both in terms of time and quality of events that are passed in a person's life in his environment. The experience of farming is long enough then, farmers have high experience so that they can manage their farms well and will have a positive effect on the adoption of technological innovations [24].

The highest number of family members of farmers in the class interval 2 - 3 people, namely 40 families or 80%, while the least number of family members 0 - 1 people, namely 10 families or 20%. The average number of family members is 3 people. In farming activities, the number of family members will be profitable because it is a source of labor in managing the farm. However, the greater the number of family members will affect the amount of expenditure in the household. [25] said that with a large number of family dependents, it can spur farmers/heads of families to increase productivity and

farm fields on the land they cultivate because of the large number of family members they have to support.

The size of the respondents' farms varies, the largest land area is in the interval 0.25 Ha - 1.5 Ha as many as 42 people (84%). The least land area is owned by respondents in the interval 2.86 Ha - 4 Ha, totaling 2 people (4%) and the average land area is 1.07 Ha. Land is vital in the agricultural business as one of the main capitals of this sector. The larger the area of agricultural land owned, the greater the potential for production. Awareness of the importance of land for agriculture should be balanced with awareness to maintain environmental balance, so that nutrient sources for the soil can remain fulfilled so that land utilization can also be carried out [26].

Table 2 shows that there are 3 (three) forms of local wisdom that were carried out before planting, namely *tudang sipulung*, *mappamula* and *mappalili*. There are 3 (three) local wisdoms that were carried out during the provision of seeds and the initial planting, namely *maddoja bine*, *mampo* and *mappamula mattaneng* where the *Maddoja bine* tradition has begun to be abandoned by the community (farmers) now and the traditions before harvest and harvest that are still being carried out are 2 (two) namely *mapposoro* and *mappadandang*.

Tudang sipulung means gathering. *Tudang sipulung* in local language is sitting together. *Tudang sipulung* is carried out before planting/sowing the seeds. This *tudang sipulung* is a discussion carried out by the farming community in the rice field agro ecosystem to determine the initial design/planning before starting to cultivate the land.

Narration of "Km", that *Tudang sipulung* is a ceremony carried out before planting seeds, eating together (*manre sipulung*), or sitting together (*tudang sipulung*), as a form of participation in making decisions in agriculture. *Tudang sipulung* is a farmer meeting, where they gather and convey their suggestions or complaints related to agriculture. The purpose of *tudang sipulung* is to produce an agreement between the government and the farming community in terms of determining the planting plan, what type of technology will be used and what means are needed by the farming community in carrying out their farming business.

Mappalili is one of the local wisdoms of the farming community in the rice field agro ecosystem which is still practiced by most of the people in Samaulue Village. *Mappalili* comes from the word *palili* which means to protect rice plants from something that will disturb or destroy them. More specifically, this *mappalili* activity is to pray together for the success of the farming being carried out and to avoid disasters that might befall their farming so that this *mappalili* activity is still carried out. The implementation of the *mappalili* event is usually

accompanied by collecting various types of equipment used in farming which is then given a spell in the form of a prayer to Allah SWT by religious leaders. The aim is that the equipment used can help them and in the hope of generate abundant production. The results of this study are in line with the findings of [27] which stated that the level of perception of the farmers of Manakku Village, Labbakang District, Pangkep Regency regarding the local wisdom of the *Mappalili* tradition is very good.

The *Mappamula* tradition, as one of the local wisdoms in Samaulue Village, is still carried out because some people still believe in the existence of supernatural powers and supernatural powers which can cause failure to obtain crops from the commodities they cultivate. The *mappamula* activity has become a suggestion that has become a motivator for most of the people in Samaulue Village that they trust, therefore the *Mappamula* tradition is still being carried out today even though some people now do not believe in it and carry out the tradition only out of habit.

The activities of providing seeds and initial planting are termed in the local language called *Mampo* and *Mappamula* taneng. *Mampo* is spreading seeds/or planting seeds in the rice fields, but in this activity, there are no special activities in the form of special ceremonies, only usually farmers before carrying out *mampo* activities read "Bismillah" with prayer and sincere intentions to rest their hopes on the Almighty and hope for the results of their farming provide high production from the previous growing season. This local wisdom is generally carried out by the farming community in Samaulue Village because farming activities require that these two activities are absolutely necessary because it will not be possible to expect production results from farming if you do not do this activity (sowing seeds and starting planting). The research findings are in line with the findings of [28], before starting to spread seeds on cultivated moor land, farmers in Pacarejo Village usually carry out a tradition that has been passed down for generations. This tradition is called the *wiwitan* tradition, the tradition is intended and carried out as a form of farmer's belief in Dewi Sri so that production is abundant.

Local wisdom in the form of a traditional reaping ceremony or commonly termed harvesting is carried out in two processes, namely before harvest (*Mappasoro*) and postharvest (*Mappadandang*). The implementation of *Mappasoro* activities is usually carried out when the rice has started to turn yellow and is ready to be harvested. This activity is carried out by each landowner by preparing a set of offerings such as sticky rice (*Sokko* in the local language), organic chicken eggs and bananas. The provision of these offerings is meant to repel reinforcements before harvesting.

Mappadendang activities are carried out after harvesting. *Mappadendang* local wisdom is an expression from farmers and community members for the success of the results of their one year of farming as a form of gratitude and to get blessings from God. The *Mappadendang* activity has become a symbol in the community for rice field agro-ecosystems which are carried out en-masse, especially when there is a big harvest. This activity involves farmers, the community and village apparatus together to become a cultural party with *mattojang/mappere* attractions/performances (playing and competing on traditional swings) and various arts and cultural activities in the local community. Based on the research done by [29], it was found that there are three functions of post-harvest rituals, namely the religious-spiritual function of connecting humans with an almighty substance that is considered capable of helping humans in carrying out farming activities), social functions (becoming a bridge of integrative social relations, both among the residents themselves) and psychological functions (raising new beliefs that they have become individuals with clean souls).

Various local wisdoms in production activities that are still carried out by the farming community in Samaulue Village have created a new spirit in the community's soul to face the new planting season. Farmers generally adapt to the surrounding environment due to the limited knowledge they have, such as in processing land in a traditional way, limited capital and simple tools used in working. Therefore, the resulting production is still low and in the end the income will be much lower. Based on these conditions, farmers then try to develop in terms of the use of agricultural tools, but in their management, they still maintain local wisdom in the village. This is done with the aim of increasing the production and income of farmers [30]. Moreover, [31,32] mentioned that local knowledge owned by farmers for generations had adapted to environmental condition as an effort to maintain land productivity sustainability in a short term and prevent a decrease in soil productivity in a long term. On top of that, it is also necessary to maintain the community's health in order to achieve social development.

Based on the data in Table 3, the results of interviews and FGD activities provide information that the dimensions of food security from the aspect of food availability in Samaulue Village, people rely on the availability of food that comes from their land, buying at local markets or rice selling kiosks or at rice mills in their area. Households in Samaulue Village have a habit of storing the produce from their farming activity in their private barns. Additionally, respondents also usually consume glutinous rice which is processed into "*Sokko*" (glutinous rice) for certain traditional events or

activities. Other food sources owned come from livestock (cows, goats and chickens).

The dimension of food security from the aspect of food access, the main food needs of the families of the Samaulue Village are fulfilled from agricultural products, while for additional food needs and daily needs are available in stalls or shops and kiosks and to get the people's daily needs there is one local market in Samaulue Village. This is in line with the results of research from [33] which stated that farming households have direct access to the staple food, namely rice. This is because farmer households have direct access in the form of rice fields which are the foundation for rice farming.

The dimension of food security from the aspect of food absorption, the respondents underwent a pattern of eating three times a day, the respondents consumed rice, vegetables and fish as side dishes. For fruits, people consumed bananas, papayas, or watermelons. Consumption of food other than the staple food rice, farmers in Samaulue Village also consume meals that can replace rice. The meals that are often consumed by the respondents are "*Pule Warelle*" (mashed and steamed corn like rice and topped with grated coconut) and "*Pule Utti*" (pureed and steamed young bananas and topped with grated coconut) and also consume tubers.

The results of the FGD also provided examples of local wisdom in fulfilling food security (production, distribution and consumption stages), namely: it is not permissible (*pamali*) to take rice from the rice storage to give to others, because it could be difficult later in providing food in the household; the rice storage cannot be empty (*denawedding kosong* "*pabbaressengngeng*"): *Pabbaressengngeng* (local language of the Bugis tribe: namely the place to store rice in the house; the people in Samaulue Village have a habit when they eat they always do the "*Mappatala* Tradition" (eating together) so that food is distributed evenly to all family members. Eating together becomes an activity for all family members so that togetherness in the family can occur. In addition, the community also carries out a message of wisdom from their parents that when eating, food should not be left and when eating, food should not be scattered.

Based on the description on the results of the research it is concluded that:

1. Local wisdom that refers to local culture in the cultivation of rice field agro-ecosystems in production activities includes: *tudang sipulung*, *mappalili* and *mappammula* (pre-planting activities) and *mampo*, also *mappammula mattaneng* (seed provision activities and initial planting).
2. The form of local wisdom is to prepare food reserves in the household, the tradition of

mappatala (eating together), *pamali* (not allowed) to empty the rice container (*pabbarrassengeng*) in the house has an impact on the rice field agro-ecosystem community which never experiencing hunger, even though there is a scarcity of rice, because the community has independently prepared food reserves.

In general, the management of rice field resources in Pinrang Regency needs to consider the wealth of existing local wisdom and carefully identify the social characteristics of the community in order to form values that are realized in everyday life as a basis and philosophy in building harmony, harmony between humans and the surrounding natural environment, so as to bring optimal results.

Conflict of Interest

The authors declare that there is no conflict of interest.

Author Contributions

The authors confirm contribution to the paper as follows: study conception and design: I. Rosada; data collection: Nurliani; analysis and interpretation of results: I. Rosada, Nurhapsa; draft manuscript preparation and translation: F. D. Amran; article submission: S. N. Sirajuddin. All authors reviewed the results and approved the final version of the manuscript.

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