Development strategy of brown rice farming

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Abstract. Dryland is one of the resources that have great potential for agricultural development, especially fields that produce rice to meet people's food needs. Paddy fields consist of several varieties, one of which is brown rice. The research was conducted in Paminggalang Village, Sendana Subdistrict, West Sulawesi, Indonesia by considering that the farmers are utilizing dry land as farmland for paddy fields. Information collected is in the form of internal factors consisting of the position of resources and farm performance. In addition, external factors include the social environment, economic environment, ecological environment, technological environment, and government policy. Some possible development strategies for brown rice farming. They are input supply strategies, cultivation strategies, harvest strategies, and marketing strategies.

1. Introduction

Food needs of the Indonesian people are still very dependent on rice. National rice production is largely contributed by lowland rice production, meanwhile, the availability of lowland land and the efficiency of lowland rice farming tends to decrease [1]. One of the efforts made by the government in meeting the food needs of the community is through the use of dry land as an agricultural area. Dryland is one of the resources that have great potential for agricultural development, especially fields that produce rice. Expansion of direct dry seeding may increase species with in-between water adaptability to hygrophytes and mesophytes, and decrease hydrophytes and mesophytes. This characteristic was remarkable under poor water conditions [2]. The factors which have contributed to the sustainability of rice production over its evolution are explored. Sustainability is defined as the maintenance or improvement of production levels and protection of natural resources, within the context of economic viability and social acceptability [3].

West Sulawesi is one of the provinces that develops paddy field agriculture. Paddy production in West Sulawesi, especially Majene Regency is still very potential to be developed, both in terms of the application of technology and facilities and infrastructure that can encourage increased farmers' income. So that this is expected to be able to realize food independence that will have an impact on the strength of the domestic economy that is able to provide food for all people in sufficient quantities and can be obtained from time to time [4].

Majene Regency as the largest producer of paddy in West Sulawesi Province which reached 8,257 tons of dry unhusked paddy (GKG) in 2015. This shows that the potential of paddy farming is still very large to be developed in the Majene Regency. Information on the harvested area and total paddy production in Majene Regency based on sub-districts in 2017 (table 2).
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| Sub-Districts      | Harvest Area (Ha) | Production (Ton-GKG) |
|--------------------|------------------|----------------------|
| Banggae            | -                | -                    |
| Banggae Timur      | -                | -                    |
| Pamboang           | -                | -                    |
| Sendana            | 639              | 2,189                |
| Tammerodo          | 230              | 660                  |
| Tubo Sendana       | 20               | 60                   |
| Malunda            | 400              | 60                   |
| Ulumanda           | 1,513            | 5,522                |
| Total              | 2,802            | 9,831                |

Brown rice field rice production in Sendana Sub-district shows a positive value and always increases every year. One of the villages in Sendana Subdistrict that produces brown rice fields is Paminggalang Village, where almost all of its people work as farmers. Nevertheless, the increase in production is not in line with the welfare conditions of farmers. The high price of brown rice cannot increase the income of the brown rice farmers in Paminggalang Village. The low consumer interest in brown rice is one of the reasons for the low income received by farmers.

The reality on the ground shows that farmers in Paminggalang Village generally consume their own harvested brown rice, only a small portion is sold to Polman District. Lack of knowledge of farmers about business opportunities and marketing of brown rice is one of the causes of low income levels. Therefore it needs to be analyzed regarding the strategies carried out by a farmer in Paminggalang Village over the past few years.

2. Methods
This research was conducted in Paminggalang Village, Sendana Sub-district, Majene Regency, West Sulawesi Province, Indonesia. Determination of the location is done by purposive sampling with the consideration that the production of upland rice is the most cultivated commodity in Sendana Subdistrict which is 2,189 tons of Dry Grain Paddy (GKG) in 2017. In addition, Paminggalang Village is the largest center of paddy rice production in Sendana Sub-district. The selection of informants was conducted by purposive sampling, namely, 6 main informants (farmers) and 2 key informants are the Head of Paminggalang Village and extension workers who served in Paminggalang Village with the consideration that the informants were those who knew the information and directly involved in the activities of *Oryza nivara* field rice farming.

Data collected through interviews using a questionnaire. Primary data is internal factors consisting of the position of resources and farm performance while external factors consist of the social environment, economic environment, ecological environment, technological environment, and government policy. Secondary data was taken from Statistical Central Board, reports on research results of universities and research institutions, and from other literature sources and internet media.

This study employed qualitative descriptive analysis, by making direct observations of brown rice development farming conducted by farmers in Paminggalang Village and using data obtained from interviews with informants [5]. Qualitative research is a tool that can assist nurses to answer these and other probing questions about the human experience of health, illness, healing, and dying, or development of supportive, effective care delivery and environments [6].

3. Results and discussion
3.1. Rice farming in Paminggalang Village.

Paminggalang Village is a plateau region, with altitude reaching 800 meters above sea level, red and yellow Mediterranean soil types and temperatures of 23°C. Field rice farming in Paminggalang Village is carried out from generation to generation using local varieties. The process of cultivating paddy fields in Paminggalang Village consists of the process of land clearing, planting, maintaining, harvesting and post-harvesting. Field rice farming in Paminggalang Village, produces several types of varieties, such as white rice, brown rice, and black sticky rice.

3.2. The development strategy is done in Paminggalang Village.

The strategy for developing rice farming that has been carried out is as follows.

3.2.1. Strategy for the provision of production facilities. The local government, especially the agriculture service through extension workers and farmer groups, every harvest season distributes assistance in the form of urea fertilizer which is expected to help farmers in terms of providing production facilities for brown rice farming. However, farmers do not use the fertilizer for brown rice farming, this is done because the fertilizer is not in accordance with the type of soil on the land planted with paddy fields. The type of soil in Paminggalang Village is generally red and yellow mediterranean so that it is considered to be incompatible with the use of urea fertilizer which only contains macro nitrogen elements. It can also be said that resources are components of an ecosystem that provide goods and services that benefit human needs [7]. The use of urea fertilizer for farmers is the same as wasting fertilizer because its use is not very influential on rice plants in brown rice fields. Fertilizer needs are fulfilled independently by each individual farmer, while the type of fertilizer that is considered in accordance with the needs of farmers is ZA fertilizer, which content consists of macro nitrogen, sulfur, and sulfur, which is obtained from agricultural shops located in the capital city district with a distance of 10 km from Paminggalang Village. Whereas the fertilizer provided by the local agriculture service is used for annual crops, namely cloves. Production facilities such as herbicides commonly used by farmers are also obtained from agricultural leaders in the subdistrict capital, while equipment such as machetes, sickles, and hoes are obtained from traditional markets as well as craftsmen/blacksmiths in Putta'da village, which is approximately 7 km from Paminggalang Village.

Farming of paddy fields in Paminggalang Village was carried out from generation to generation using local varieties, but in 2013 to 2015, farmers received assistance in the form of superior varieties of improved brown rice from the agriculture service through the village government and farmer groups. After 2015 farmers no longer want to receive the assistance with consideration, the grain of rice produced is smooth and hairless, so those wild boars are considered as pests for farm rice. In addition, superior seeds planted are also considered incompatible with the type of soil on the farmer's grounds on the grounds that rice fields that grow are dwarfed. So farmers choose to use local varieties that are considered more suitable, marked by plants that grow and produce feathe brown rice grains so that they are not liked by wild boar. In meeting the needs of seeds, farmers in Paminggalang Village save the harvest which is then used as a seed in the next growing season.

3.2.2. Cultivation strategy. One of the important things to do in cultivating paddy fields is land clearing and land preparation for planting. Farmers in Paminggalang Village generally do land clearing before planting. Land clearing is done by using equipment such as hoes, sickles, and machetes. The use of this equipment is generally to clean weeds that are considered disturbing plants. In addition, some farmers also use herbicides to destroy weeds before they are burned. The use of herbicides by some farmers is considered good for clearing land because the process is fast, compared to physical clearing of land using hoes, sickles and machetes can be done for 4-5 days and uses a lot of labor, while chemical land cleansing using herbicides can be done alone for 3 days ie the first day sprayed, and the third day burned. Generally, farmers in Paminggalang Village prefer to clean weeds physically on the grounds that the process of physical cleansing using a hoe can loosen the soil, and can be planted immediately after cleaning. Whereas chemical cleaning, after burning land cannot be
planted immediately but must be left for 6-7 days on the grounds that land has been burned hot and needs cooling before it can finally be planted.

The next stage in the process of brown rice cultivation in Paminggalang Village is the planting stage. Planting is carried out in November and or December, and cannot be done simultaneously, it is done based on the calculation of the good days for planting and involving customary leaders/community leaders. After obtaining permission from the traditional headman, farmers can plant. This stage of planting is carried out in mutual cooperation with fellow members of the farmer group, with the aim of maintaining tradition and saving labor costs. The seeds planted are the seeds of local varieties that have been prepared by farmers and obtained from previous harvests that are stored for seed. The planting process is carried out in two ways, namely the scattered planting system and the tugal planting. Scatter planting, is a method of planting by spreading the seeds evenly on the surface of the land that has been prepared. Whereas the planting is done by making a hole as deep as 3-5 cm and then put in 3-5 seeds and covered with soil to avoid being eaten by birds.

The scatter planting system is carried out more by farmers than the tugal planting system, this is done with the aim of saving time and labor. If the scattered planting system can be carried out in a vulnerable time of 4-5 hours/ha with a workforce of 6 to 7 people, then a tugal planting system can be done 8-10 hours/ha with a workforce of 6-7 people. This is also related to the condition of farmers' land which is in the hills and has a fairly steep slope. So farmers can save more time working and can do other activities outside the field of rice farming.

After the planting stage is complete the farmers just wait until the harvest time arrives. About 80% of farmers in Paminggalang Village do not use fertilizers in the cultivation process, only a small proportion do fertilization. In this waiting period, farmers usually do weeding (weeds) that disturb the plants. Weeding is done using a sickle, according to farmers weed control by using a sickle can help loosen the soil so that it can improve the area of the soil.

3.2.3. Harvest strategy. Harvesting is done by farmers in Paminggalang Village using ani-ani. The process of harvesting paddy fields, especially brown rice in Paminggalang Village, usually uses female workers who are more dominant with the consideration that women workers are more skilled and precise so as to maximize yields. As for the payment of wages for workers do not use money as wages but grain yields with a ratio of 2: 5 in the sense of every 5 bases (small ties measuring 3-4 kg of dried grain harvest) workers get part 2 base/bunch. This wage distribution system is not flat based on the amount of base/bundle that the worker gets.

3.2.4. Marketing strategy. Marketing in a business activity becomes an important thing that needs to be considered this relates to aspects of the product, price, distribution, and promotion [8]. The village government has given great support to the provision of a market for the production of brown rice farming in Paminggalang Village. The form of support carried out by the village government is by providing a mill for farmers because access to the village exit with the aim of grinding the harvest can be quite difficult. In addition, the village government also seeks some access to selling paddy rice, especially brown rice, by holding an exhibition of agricultural products, and collaborating with several agencies related to the sale of brown rice to its members, such as teachers at SMAN-1 (Senior High School) Sendana, SMK-8 (Vocational High School) Majene, District Offices, and several other agencies.

4. Conclusion
The development strategy of brown rice farming starts from supplying inputs strategy, cultivation strategies, harvest strategies, and marketing strategies. Production inputs used were obtained independently by the community and assistance from the local government besides the farmers began to abandon their habits which generally use a shifting farming system, guaranteeing the availability of seeds because of using local varieties of seeds produced by farmers, the village government provided support through the supply of grain milling machines, as well as increasing sales through collaboration.
with various agencies, including the production of rice farming in various exhibitions about the potential of the region.

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