

Understanding the social and economic aspects of upland rice farming

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Abstract. The objectives of this study were to (1) analyze the socio-economic characteristics of upland rice farmers, and (2) to analyze the productivity of farming in South Konawe Regency of Southeast Sulawesi Province, Indonesia. The analysis used in this research was combine economic research through quantitative and qualitative analysis. This research was conducted by survey method. The results showed that (1) farmers are generally in productive age, dominated by men, with low formal education level, and moderate family members, (2) upland rice farming is cultivated in medium land area, with fixed costs higher than variable cost, productivity that has been increased but still lower than rice paddy, and the price of rice production is relatively higher than rice paddy production price, and (3) feasible to cultivate dryland rice, and has a high efficiency value.

1. Introduction

As the world's population increases, food provision is crucial to every country and it is a debate on how to ensure global food security [1]. As in some countries in Asia [2] and Africa [3, 4], rice also plays an important role in the economy and is a staple food for most Indonesians [5]. Therefore, the provision of sufficient quantities and affordable prices is a top priority of national development. Every ruling leader will make every effort to meet the needs of his people. In the 2015 was born Special Effort (UPSUS) program, which establishes sustainable self-sufficiency for rice, corn, and soybeans that can be achieved in 2018 [6]. It is a fact that so far the mainstay of national rice production has always focused on irrigated wetland rice fields, especially in Java. While the contribution of dry land (where to grow upland rice, or gogo rice) that its availability is spread in various islands in Indonesia is not utilized optimally. Upland rice that produces a product of red or black rice, is underestimated so that the productivity achieved is low [7].

Similarly, in South Konawe Regency of Southeast Sulawesi Province, the development of upland rice did not show a significant increase, whereas this area is quite potential, both in terms of supply



and demand side. In terms of supply, there is dryland, high biodiversity, suitable climate, and farmers have been used to cultivate upland rice. From this aspect of supply, one way to increase production is by optimizing the utilization of various biodiversity potentials [5]. From the demand side, the demand for brown rice tends to increase, because the community considers its benefits as functional food [7, 8]. Approximately 80 percent of consumers of red or brown rice (local rice) in Kendari buy rice from other regions because it is more profitable. Where there is a price difference of IDR 18,500 kg⁻¹. The average buying price is IDR 9,000 kg⁻¹. If you buy brown rice sold in mini market or super market in Kendari City, the price is very expensive that reaches IDR 27,500 kg⁻¹. The price continues to increase. The latest survey shows that the price of brown rice in Kendari has reached IDR 33,500 kg⁻¹ [9]. The price of brown rice is relatively very expensive, because it is generally imported from outside the province of Southeast Sulawesi, namely from the island of Java.

One of the main agendas to fulfill rice needs is to encourage better, effective and efficient production systems [10]. A good, effective, and efficient production system is one of the aspects that must be met to achieve a sustainable livelihood for the fulfillment of various needs of farmers and their families. As a result of low productivity, which only reached 412.55 kg Ha⁻¹ per planting season [9], lower than the productivity figures released by the Central Bureau of Statistics, which reached 3.12 tonnes Ha⁻¹ [11]. The upland rice farmers in South Konawe can not rely on income from upland rice farming. Dryland rice farmers can be called small farmers (peasant). Because they are farmers who do not fully gain market access and because the household functions both as a unit of production and consumption. Therefore, this research needs to be done because to obtain information about the socio-economic condition of farmers and their families, as well as the state of production, productivity, income, and efficiency of farming. Because during this time, the production of upland rice is obtained from land that has been planted several times with traditional cultivation practices, the productivity is so low that it affects the welfare of the farmer's family [9]. Information on socio-economic aspects and aspects related to the production of upland rice is very beneficial for the government to reduce the gap, especially for dryland rice farmers.

2. Material and Method

The population of this research is rice farmer in 2 (two) districts, namely Wolasi and Baito in South Konawe Regency, Southeast Sulawesi Province, Indonesia. As is known from previous studies [9], that the dryland rice farmers in Wolasi Sub-district are all Tolaki ethnic, while in Baito sub-district is a mixture of ethnic Tolaki and Java. The number of selected samples is 81 people representing farmers' households. Determination of the sample using simple random sampling, by taking 25 percent of the total population. This research was conducted by survey method.

Primary data is the data collected by (1) conducting interviews at the group level to the individual scope in the household, (2) observation at the location of cultivation, and (3) application of cultivation technology, especially the introduction of technological packages of increasing productivity of dryland rice. The analytical tool used descriptive statistics such as maximum, minimum, and average values, as well as percentages. Also used income analysis and R-C ratio. For income analysis, using the profit formula [12]:

$$\begin{aligned} \text{Profit} &= \text{TVP} - \text{TC} = \text{TVP} - \text{TVC} - \text{TFC} \\ &= P_y Y - P_x X - \text{TFC} \end{aligned} \quad (1)$$

In accordance with the purpose of this study, adjustments are made to (1) to:

$$I = \text{TR} - \text{TC} \quad (2)$$

$$\text{TR} = P_q * Q \quad (3)$$

$$\text{TC} = P_{xi} * X_i + \text{TFC} \quad (4)$$

Where: I = Income, IDR/Year

TR = Total Revenue, IDR/SP (IDR/SP); 1 Season Planting about 4.5 month

TC = Total Cost, IDR/PS; TFC = Total Fixed Cost, IDR/PS

P_q = Price of Brown Rice, IDR Kg⁻¹; Q = Quantity of Brown Rice, Kg⁻¹

P_{xi} = Price input (IDR per unit); X_i = Amount of input (unit)

The formula for assessing farm efficiency is R-C ratio: R/C = TR/TC

In Indonesia, for socio-economic aspect, there were three category of age, namely productive age yet (< 15 year), productive age (15-54 year), and not productive age (>54 year). For socio-economic aspect of education contain at least five category, such as: no school, elementary school, junior high school, high school, and bachelor degree.

3. Result and Discussion

3.1. An overview of the practice of upland rice cultivation

The cultivation system practiced by the upland rice farmers in South Konawe Regency is still very simple. In many aspects, they still follow the habits of their predecessor parents. In fact, in some aspects they are still very strong in holding these habits. For example, should not kill pests such as rats, pigs, and monkeys. Because it will cause the animals are angry and will increasingly increase his attacks on the plant. The use of modern technology in gogo rice farming is very limited, both equipment technology to facilitate various work in the process of cultivation to harvest, and technology such as superior seeds, fertilizer, and the eradication of weeds, pests and diseases. The results showed that the practice of upland rice cultivation by farmers is still done in 2016 [9], except in the case of the use of liquid organic fertilizer. The results showed that farmers have used organic fertilizers in the form of ZPT, NPK, and POC, both in soaking rice seed and to increase the availability of nutrients for plants. Activities in the upland rice farming are carried out independently by farming families (land clearing, weeding, fertilizing), and some are carried out in mutual assistance with farmers or other families (in cultivation, and harvesting).

3.2. Social characteristics of farmers

The socio-economic characteristics of the upland rice farmers is important to illustrate the efforts of the farmers. So it can be understood what and how the actions they take in managing dryland rice farming. Description of the social characteristics of the upland rice farmers is presented in Table 1.

Table 1. Social Characteristics of Farmers

Description	Types of Social Characteristics											
	Age (Year)		Gender		Education					Family Size (Person)		
	25-54	>54	M	W	NS	ES	JHS	HS	BD	1-3	4-6	>6
Number of Respondent (n)	62	19	67	14	5	48	13	12	3	19	50	13
Percentage (%)	76.54	23.46	82.72	17.28	6.17	59.27	16.05	14.81	3.70	23.50	60.50	16.00
Total (n, %)	81 (100%)		81 (100%)		81 (100%)					81 (100%)		

Note: n = number of samples; M = Man; W = Woman; NS = No school; ES = Elementary school

JHS= Junior high school; HS = High school; BD = Bachelor degree

Age dimension is a reflection of maturity level of one's thinking, also shows the level of rational consideration of a person in making decisions related to the problems encountered. Besides, the age of a person will determine the physical ability in doing a job. The results showed that the majority of respondents in South Konawe Regency were in the age range 25 to 54 years with the percentage of 76.54%, while the remaining 23.46% were in the age range more than 54 years.

The concept of gender in this paper is not only interpreted as a physical distinction or segregation, but also related to the consequences of such segregation socially. Table 1 informs that upland rice farmers in South Konawe Regency are dominated by male respondents (82.72%), while female respondents are 17.28%. It caused in managing rice farming gogo (upland rice farming) required a strong physical ability in performing stages of production ranging from land processing to post-harvest.

There are 6.17% of respondents who have never received formal education, 59.27% have elementary school education, and 3.70% have gone through higher education. Thus it can be said that most of the farmers have a formal education that is low. Therefore, to improve the knowledge, skill,

way of thinking and creativity in running upland rice farming needs to be supported by non formal education.

The number of family members owned can be a source of manpower to assist in the management of farming, so as to increase the production and income of the family. Therefore, the number of family members in a household, describes the availability of labor [13]. With the availability of sufficient labor in a household, then in a farming activity is not required rental labor from outside the family.

3.3. Characteristics of farming

Characteristics of farming can vary between place, time, and culture of the surrounding community. This difference will have implications on many aspects, including on production, productivity, production costs, revenues, profits, and efficiency of cultivated upland rice. In this section will be described on the area of arable land, production costs, productivity, and price of upland rice. Description of the characteristics of upland rice farming is presented in Table 2.

Table 2. Characteristics of Gogo Rice Farming

Description	Types of farming characteristics									
	Land area		Production cost (IDR)		Productivity (Kg Ha ⁻¹)			Production price (IDR Kg ⁻¹)		
	>0.5 Ha	0.6-2 Ha	VC	FC	Min	Max	Average	Min	Max	Average
Amount	19	62	94938	274993	120	2128	476	12000	13000	12500
Persentase (%)	23.46	76.54	25.67	74.33						
Total (n, %)	81 (100%)		369.931,- (100%)							

Note: VC= Variable cost; FC = Fixed cost

Land is a very important asset for a farmer. The size of the land determines the scale of the farm, affects the amount of use of other factors of production, and will ultimately determine the level of production and income of farmers. The results showed that 19 respondents or 23.46% manage the land with the width of <0.5 Ha (narrow land) and 62 respondents or 76.54% of the total respondents manage the land of 0.5 - 2 Ha (medium category). This result confirms that based on the area of land managed, generally farmers are categorized as moderate land owners (average 1.02 Ha). In Indonesia, researchers often use farmers' categorization based on the area of land under control, ie narrow land area (<0.5 ha), medium land area (0.5 - 2 ha) and large area (> 2 ha) [14]. The extent of land tenure is also a measure of one's social status, which of course will have different economic impacts.

The cost of production is the value of all input in conducting a production process of farming. The cost of production of upland rice farming in this study consists of variable costs and fixed costs. The results showed that the production cost incurred by the upland rice farmers in South Konawe Regency consisted of wage labor (as variable cost) that is average of IDR 94,938 per planting season or 25.67% of total production cost. The fixed costs consisting of land and equipment depreciation amounted to IDR 1,444 (0.39%) and IDR 273,549 per planting season (73.94%), with an average total production cost of IDR 369,931 per planting season. The cost is much lower than the production cost of paddy field farming which can reach 3 to 6 million per planting season.

Based on the results obtained, it is known that the productivity of upland rice farming ranges from 120-2,128 Kg Ha⁻¹ rice with an average of 476 Kg Ha⁻¹ rice per planting season. The productivity of upland rice is much lower than the productivity of lowland rice farming which can reach 2,400 - 3,000 Kg Ha⁻¹ per planting season. The low productivity of upland rice farming system is generally caused by the lack of application of good and proper cultivation technology in the production process. One of the most prominent causes is the absence of nutrients into the soil, so that the soil structure becomes hard. Also the area of ubiquitous rice cultivation that is still overgrown with grass, planted with

agroforestry and intercropping systems, and with irregular spacing. One proven way to increase productivity of upland rice is by bokashi application [5] as well as the technology of varieties and terraces [15].

The nowadays phenomenon is rarely encountered is the main motive of the production process of gogo rice farmers. Their main goal is to meet the food needs of his family. The grain or rice they produce is primarily intended to meet the staple food needs of all family members. Price information shown in Table 2 confirms that the price of upland rice ranges from IDR 12,000 to IDR 13,000 Kg⁻¹, with an average price of IDR 12,500 Kg⁻¹. This indicates that the price of gogo rice is higher than rice price of wetland rice which only reach IDR 8,000 to IDR 10,000 Kg⁻¹. The higher price of red rice from upland rice is a common phenomenon for organic products [7]. Thus, upland rice has good prospects to be developed in the future. Because it is not only a healthy product [16], but also economically expensive.

3.4. Revenue, income, and efficiency of farming

Table 2 shows that the amount of income from farmers of respondents from upland rice farming ranges from IDR 960,000- IDR 25,536,000 with an average of IDR 5,961,798 per planting season. Ownership of cultivated land for an average of 1.02 hectares of paddy field is obtained per hectare amount of IDR 5,844,891 per planting season.

The result of the analysis shows that the activity of upland rice farming in South Konawe Regency gets income/profit from economic aspect. The farmers' income amounts to IDR 725,000-IDR 24,892,667 per planting season, average income of IDR 5,601,743 per planting season. If the value of such income is converted into income per month, the value of IDR 1,400,436 is obtained. If the value is divided by the average number of household members for 5 people, then per capita income per month is IDR 280,087. The amount of this income is lower than the standard of the rural poverty line of rural Southeast Sulawesi Province of IDR 317,881 per capita per month [17]. Based on this condition, if gogo paddy farmers rely solely on income from working in gogo rice farming without improving cultivation technology, then the income earned is very small. Thus, the households of upland rice farmers in South Konawe Regency are still classified as poor.

Table 3. Revenue, Income and Efficiency of Upland Rice Farming

Description	Total revenue (IDR/Season)	Income (IDR/Season)	Farming Efficiency (R/C)
Minimum	960,000	72,5000	2.0
Maximum	25,536,000	2,489,2667	77.7
Average	5,961,798	5,601,743	27.3

Income earned, not the primary measure to assess the success of a farm. By him it is necessary to know the efficiency of the production process undertaken, to determine the sustainability of upland rice farming. This is done so that farmers can know how much the level of profits obtained due to the cost that has been sacrificed during the production process. Analysis of the efficiency of upland rice farming in this study is proxied based on the return cost ratio (R/C) approach. The results showed that the efficiency of upland rice farming in South Konawe Regency was very good (efficient), with an average value of 27.3. The results of the study in Aceh also corroborate the findings of this study, that the gogo rice farming is financially feasible [18].

When compared to the value of farming efficiency gained previously [9], this result is higher and the value improves. The increased efficiency of farming can be attributed to the improved production practices practiced by farmers, which in previous studies [9] show some inefficient gogo rice farming. This condition also implies that there is an increase in income obtained by upland rice farmers. A good income condition shows that the upland rice farmer has been able to sovereignly meet his daily food needs. Nevertheless, the income condition of these dryland rice farmers needs to be harmonized

with the social factors of other farmers' households. This is for the formulation of specific policies related to the adoption of organic agricultural technology in sustainable rice farming. This should be done considering that upland rice has important importance [18] is a people's plant, where most of the people's agriculture is dry land without irrigation.

4. Conclusion

Some conclusions can be drawn: (1) Gogo farmers are generally in productive age, dominated by men, with low formal education level, and moderate family members, (2) upland rice farming is cultivated in medium land area, and the price of rice production is relatively higher than wetland rice production price, and (3) in South Konawe Regency is feasible to cultivate dryland rice, and has a high efficiency value.

The policy implication that can be recommended to local government of South Konawe Regency is to encourage the introduction of good and proper dryland rice cultivation technology (environmentally friendly), the use of liquid organic fertilizer, and the improvement of the human resources of farmers through the strengthening of community institutions. In addition, the government also needs to prepare professional extension workers, in order to assist the community in carrying out the cultivation of upland rice.

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