Increasing production and income of rice farming: Keywords of food security and poverty alleviation

Rajindra, S Jumiyati and Irmawati
Department of Agribusiness, Faculty of Agriculture, Muhammadiyah University, Jabal Nur Street No. 1 Palu 94119, Indonesia

Email: srijumiyati1068@gmail.com

Abstract. Farmers' income is a good indicator of farming feasibility through the large ratio of income to farm costs. The income of rice farmers also has an impact on the level of poverty and household food security of farmers, which is related to the ability of farmers to meet food needs based on the income received from rice farming. This research was conducted using a survey method through qualitative and quantitative approaches. Determination of the location and research respondents was carried out deliberately by the method of purposive sampling method in 1 (one) farmer group totaling 20 farmers (heads of families). The results showed that the amount of production, price, cost, and income of rice farming would affect the income and farm feasibility index. The feasibility ratio of more than 1 (2.34) indicates that rice farming has a comparative advantage, but the feasibility value has not been able to lift rice farmer households from poverty. The average rice farmer household in the Labuan Toposo Village is in the criteria of “Poor” households with a household income equivalent to a value of between 240-320 kg of rice/person/year. However, even though the farmer's family is classified as poor, by having a side business, the average farmer household can have food security from a side business by raising livestock and utilizing the yard by growing vegetables and fruit, taking non-timber forest products such as rattan and honey.

1. Introduction

Almost all countries in the world set development policy agendas that generally include dimensions of poverty alleviation, improvement of quality of life, and food self-sufficiency [1]. The same analogy is also found in the agricultural sector in Indonesia, which has abundant economic potential and resources, but most of the farmers are still entangled in poverty [2]. Data from the Central Statistics Agency (BPS) shows that out of a total of 36 million poor people (17 percent of the total population of Indonesia), more than 15 million of these poor people are in rural areas who are generally involved in or associated with the agricultural sector [3]. More than 75 percent of these poor farmers are farmers of food crops, especially rice crops. The main target of agricultural development at this time is to increase the household income of farmers and also to achieve food self-sufficiency [4]. The success of agricultural development in Indonesia is marked by the achievement of national food self-sufficiency [5]. This has an impact on reducing the level of poverty in Indonesia both in rural and urban areas due to strong economic growth with integrated development programs [6].

The high level of poverty in rural communities can be used as an indication of a decrease in the level of welfare, which means a decrease in the level of public consumption [7]. In simple terms, poverty is defined as a condition in which a person cannot fulfill his basic needs, namely the need for food [8]. Food security is a condition in which people are physically and economically able and have access to...
adequate, safe, and healthy food needs. In Indonesia, the need for food is identical to the fulfillment of rice as the staple food [9]. This shows that there is a fairly strong link between poverty and food security. Poor households in rural areas are dominated by the population with the head of the household who works in the agricultural sector [10]. Agricultural sector workers in Indonesia have a higher tendency to be categorized as working poor than other sectors. This shows that the agricultural sector is a sector that is very vulnerable to the risk of poverty compared to other sectors [11]. Increasing the productivity of the agricultural sector and increasing the welfare of farmers plays an important role in overcoming the problem of poverty [12]. In an effort towards adequate food originating from rice/paddy, the government implements various policies in line with population growth [13]. Several things that continue to be of concern in increasing production are increasing the productivity of rice farming [14].

Rice as a rice-producing crop is a very important commodity for Indonesia, apart from being a staple food producer, rice is also the main source of income for millions of farmers [15]. However, the increase in rice production and the harvested area is not an indicator of the guarantee of the amount of rice available [16]. The increase in population, which is not followed by an increase in rice production is one of the reasons. Low capital due to the relatively poor condition of farmers makes farmers’ access to production inputs limited, which also has an impact on farmers’ production and income levels [17,18]. Farmers’ income is also supported by a good level of farming feasibility through the large ratio of income to farming costs [19]. The feasibility ratio will affect the income level of rice farmers and also the level of farmer household poverty related to the ability of farmers to meet food needs based on the income received from rice farming.

2. Method

This research was conducted in the Labuan Toposo Village, which was determined deliberately by purposive sampling method, with the consideration that the Labuan Toposo Village is one of the villages in Donggala Regency as the district with the highest percentage of poor people in Central Sulawesi Province. The Labuan Toposo Village is also not only one of the centers for food crop production, but has great opportunities for business development in other sectors such as horticultural crops, plantation crops, livestock, processing agricultural products, and non-timber forest products. Respondents were also determined purposefully, in 1 (one) group of 20 farmers (head of household) with an area of land ownership of rice farming, ranging from 1 - 2.5 hectares or an average of 1.57 hectares/farmer. The data collection technique was carried out using a questionnaire (questionnaire) and direct interviews, while the data analysis to answer the problem was carried out using:

2.1. Analysis of income and farming feasibility index

Calculations are carried out using descriptive methods to determine the level of income and feasibility of farming based on the formula of Farming Acceptance Structure [20] as follows:

\[ I = TR - TC \]
\[ I = \text{Income/Provit} \]
\[ TR = \text{Total Revenue} \]
\[ TC = \text{Total Cost} \]
\[ TR = Y \cdot Py \]
\[ TC = FC + VC \]

where:

- \( I \) = Income
- \( TR \) = Total Revenue
- \( TC \) = Total Cost
- \( Y \) = Yields
- \( Py \) = Price of Yields
- \( FC \) = Fixed Cost
- \( VC \) = Variable Cost
The analysis of farming income was then continued with the Cost of Ratio (R/C) analysis to find out the farming feasibility index, which is an analysis by comparing farm income with the total farming costs. This analysis uses the equation model as follows:

\[
R/C = \frac{TR}{TC} \quad (4)
\]

- **R/C** = Index of Farming Feasibility
- **TR** = Total Revenue
- **TC** = Total Cost

With the criteria, if:
- **R/C** = 1, farming is not feasible and does not lose /break even point
- **R/C** < 1, the farm is lost
- **R/C** > 1, farming is feasible

### 2.2. Analysis of farmers’ households poverty level

Poverty level analysis is carried out using the equivalent per capita rice consumption level as an indicator of poverty in rural and urban areas.

1. Calculating the total income of rice farmers for one year equalized to the amount of rice obtained based on the local rice price level, with the formula:

\[
\text{Amount of Rice (kg)} = \frac{\text{Income (IDR)}}{\text{Price of Rice (IDR)}} \quad (5)
\]

2. Divide the amount of rice obtained during one year by the number of people that are borne by rice farming families, with the formula:

\[
\text{Kg Rice/Person/Year} = \frac{\text{Amount of Rice (kg)}}{\text{Number of Family Dependents (Person)}} \quad (6)
\]

3. Comparing the number of kg of rice/person/year with the poverty line criteria to determine the poverty level of rice farmer households, with the criteria as shown in Table 1, namely:

| Criteria   | Rural (Kg/Person/Year) | Urban (Kg/Person/Year) |
|------------|------------------------|------------------------|
| Destitute  | 180                    | 270                    |
| Very Poor  | 240                    | 360                    |
| Poor       | 320                    | 480                    |

### 2.3. Analysis of farmers household food security value

Farm household food security is carried out using descriptive analysis method based on calculations made by Anderson and Roumasset by measuring the value of food security [21] using the formula:

\[
Z = P (Q-Cm) + N \quad (7)
\]

Where:
- **Z** = Food Security Value
- **P** = Local Staple Food Price (local level)
- **Q** = Value of Household Food Production (net after deducting input)
- **Cm** = Minimum Food Consumption Required
- **N** = Income Outside of Rice Farming

The criteria used are:
- a. **Z** value > 0, means there is food security
- b. **Z** value < 0, means there is food insecurity
3. Results and discussion

3.1. Income and farming feasibility

| Table 2. Income and the rice farming feasibility in Labuan Toposo Village |
|--------------------------------------------------|
| Description | Unit | Value (IDR/ha) |
|-----------------|---------|----------------|
| Production      | Kg       | 2,486          |
| Price           | IDR      | 9,465          |
| Revenue (TR)    | IDR      | 23,529,990     |
| Fix Cost        | IDR      | 275,250        |
| - Land Tax      | IDR      | 150,000        |
| - Tool Depreciation | IDR   | 125,250        |
| Total Fix Cost (FC) | IDR | 275,250        |
| Variable Cost   | IDR      | 9,762,544      |
| - Labor         | IDR      | 6,216,302      |
| - Tractor Rent  | IDR      | 1,757,846      |
| - Seed          | IDR      | 655,000        |
| - Fertilizer    | IDR      | 757,704        |
| - Pesticides    | IDR      | 375,692        |
| Total Variable Cost (VC) | IDR | 9,762,544      |
| Total Cost (TC) | IDR      | 10,037,794     |
| Income (I)      | IDR      | 13,492,196     |
| Feasibility Index (R/C Ratio) |        | 2.34           |

Source: Primary data after processing, 2020.

Based on table 2, it can be seen that the amount of rice farming acceptance in the Labuan Toposo Village is influenced by the large number of products produced by farmers and the selling price of the product. The higher the amount of production and the selling price, the greater the income that will be received by farmers. The average rice production in the Labuan Toposo Village is 2,486 kg/year with a selling price of IDR. 9,465. Thus, the average income received by farmers is IDR. 23,529,990/ha. Income is the difference between revenue and total costs incurred by farmers in one year. Referring to the total revenue and total costs incurred in rice farming activities, the average rice farming income received by farmers is IDR. 13,492,196 / year with a total cost incurred of IDR. 10,037,794. While the feasibility index (R/C Ratio) of rice farming is 2.34, which indicates that the R/C Ratio index > 1 which means that the farming is feasible and profitable.
3.2. Farmers household poverty

Table 3. Farmer household poverty in Labuan Toposo Village per year

| No | dependents of the family (Person) | Income | Criteria | Rice Equivalent Per Person (Kg/Person) |
|----|-----------------------------------|--------|----------|-------------------------------------|
|    |                                    | Family (IDR) | Rice Equivalent (Kg) |        |
| 1. | 5                                  | 13,072,500 | 1,245     | 249                   | Poor     |
| 2. | 3                                  | 11,088,000 | 1,056     | 352                   | Not Poor |
| 3. | 4                                  | 11,760,000 | 1,120     | 280                   | Poor     |
| 4. | 5                                  | 13,440,000 | 1,280     | 256                   | Poor     |
| 5. | 4                                  | 12,054,000 | 1,148     | 287                   | Poor     |
| 6. | 3                                  | 8,947,796  | 852       | 284                   | Poor     |
| 7. | 4                                  | 12,516,000 | 1,192     | 298                   | Poor     |
| 8. | 5                                  | 14,070,000 | 1,340     | 268                   | Poor     |
| 9. | 5                                  | 14,437,500 | 1,375     | 275                   | Poor     |
| 10.| 5                                 | 14,227,500 | 1,355     | 271                   | Poor     |
| 11.| 6                                 | 14,301,000 | 1,362     | 227                   | Very Poor |
| 12.| 5                                 | 14,017,500 | 1,335     | 267                   | Poor     |
| 13.| 5                                 | 13,755,000 | 1,310     | 262                   | Poor     |
| 14.| 6                                 | 13,482,000 | 1,284     | 214                   | Very Poor |
| 15.| 8                                 | 17,052,000 | 1,624     | 203                   | Very Poor |
| 16.| 10                                | 19,950,000 | 1,900     | 190                   | Very Poor |
| 17.| 6                                 | 15,876,000 | 1,512     | 252                   | Poor     |
| 18.| 4                                 | 13,104,000 | 1,248     | 312                   | Poor     |
| 19.| 4                                 | 12,642,000 | 1,204     | 301                   | Poor     |
| 20.| 3                                 | 10,017,000 | 954       | 318                   | Poor     |

Average: 5

13,492,196 1,284.8 268.3 Poor

Source: Primary data after processing, 2020.

Based on table 3, it can be seen that the average household income of farmers from rice farming in the Labuan Toposo Village in a year is IDR. 13,492,196. Based on this income, farmers will be able to obtain 1,284.8 kg of rice as a family staple food. With an average number of dependents of a farmer family of 5 people, the rice need that can be met for each number of family members is 268.3 kg/person/year. If it is assumed that the farmer's household income only comes from rice farming, then the average rice farming respondent household in the Labuan Toposo Village is in the criteria of “Poor” households, which is a situation where farm income can only meet the food needs of members of the farmer household. Between 240-320 kg equivalent of rice / person / year. Thus, it can be concluded that rice farmer household poverty is influenced by the area of land ownership, which will affect the amount of farm production. The amount of production and the price of the commodity will affect the amount of revenue and if it is related to the cost of production it will generate the amount of income. In addition, the number of family members also affects poverty related to the family's ability to meet basic food needs based on farm income.
3.3. Farmers household food security

Table 4. Farmers household food security in Labuan Toposo Village per year

| No | Food Security Level (IDR) | Food Security Criteria |
|----|--------------------------|-----------------------|
| 1  | 15,565,000               | security              |
| 2  | 25,445,000               | security              |
| 3  | 8,900,000                | security              |
| 4  | 12,305,000               | security              |
| 5  | 10,775,000               | security              |
| 6  | 24,045,000               | security              |
| 7  | 10,450,000               | security              |
| 8  | 7,090,350                | security              |
| 9  | 6,250,600                | security              |
| 10 | 5,800,000                | security              |
| 11 | 150,000                  | security              |
| 12 | 4,080,500                | security              |
| 13 | 3,580,500                | security              |
| 14 | 350,000                  | security              |
| 15 | -15,000                  | insecurity            |
| 16 | -25,000                  | insecurity            |
| 17 | 3,650,000                | security              |
| 18 | 10,500,425               | security              |
| 19 | 9,155,300                | security              |
| 20 | 11,715,600               | security              |

Average 8,488,414.75  security

Source: Primary data after processing, 2020.

Table 4 shows that 18 farmers (90%) have household food security criteria with a level of $Z > 1$, which means that rice farmer households in the Labuan Toposo Village have food security conditions in a year with a residual income of IDR. 8,488,414.75 for needs other than staple food consumption originating from side businesses. Thus, even though based on the amount of farm income, the farmer family is categorized as poor, but by having a side business, farmers do not only rely on income from rice farming, but can have food security through income from a side business by raising livestock and utilizing their yards by growing vegetables and fruits [22]. Farming families also get additional income by taking non-timber forest products such as rattan and honey [23].

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