Farm Business Analysis of Crops in Tidal Land (Case Study in Rantau Makmur Village, Rantau Rasau District)

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Abstract. Tidal land is generally planted with rice once a year, followed by soybean cultivation. The study to determine the feasibility of cultivating food crops on tidal land was carried out in Rantau Makmur Village, Rantau Rasau District, Tanjung Jabung Timur Regency, Jambi Province from June to July 2020. The research method used a survey of 20 farmers who are members of the Bambu Kuning farmer group. The research objective was to analyze rice and soybean farming in tidal fields. The results showed that the respondent farmers were at the productive age, namely 32-61 years. The highest level of education is Elementary School (SD), namely 65%. The average land ownership is 1.3 ha. Rice farming and soybean farming in tidal land are feasible to be cultivated. The total revenue from rice farming is IDR 15,065,000 / ha / planting season (PS) with an income of IDR 8,325,000 / ha / PS. Meanwhile, revenue from soybean farming is Rp. 7,260,000 / ha / PS, with an income of Rp. 1,800,000, - / ha / PS. The ratio of revenue to costs (R / C) of rice farming is 2.2, the breakeven point of production is 1,465.2 kg / ha, the break-even point price is IDR 2,058 / kg. Meanwhile, R / C for soybean farming was 1.3 with a breakeven point of production of 910 kg / ha and a breakeven point of price of IDR 4,512.4 / kg. Keywords: Rice, soybean, faming analysys, tidal land.

1. Introduction
As result of the conversion of fertile agricultural land and the rate of population growth, tidal swamps are the present and future hope for the development of food crops, such as rice, corn and soybeans. Agricultural development in the future will more directed at sub-optimal land such as tidal land [1].

The area of swamplands in Indonesia was estimated at 33.4 million ha, consisting of 20.1 million ha of tidal land and 13.29 million ha of swampy land. Of the total tidal land area, around 9.53 million ha has the potential to be used as agricultural land and about 4.18 million ha has already been reclaimed. Thus, there is sufficient area of swampland, especially tidal, which can be developed as agricultural areas [2].

Jambi Province is one of the provinces that has a large tidal area and is a potential resource for the development of food crop cultivation. The area of tidal land in Jambi Province is 684,000 ha. Land that has the potential to be developed for agriculture is 246,481 ha, consisting of 206,852 ha of tidal land and 40,521 ha of swampy land. The area of land that has been reclaimed for agriculture is 34,547 ha consisting of 16,387 ha of potential land, 192 ha of acid sulphate and 17,136 ha of peatland.

The main problem faced in tidal land is the low soil fertility status, mainly due to acidic soil, low availability of P nutrients [11]. Several rice varieties for tidal fields have good enough yield potential for use on acid sulfate soils, such as Inpara 3 [2]. The soybean varieties cultivated by farmers are
generally Anjasmoro varieties [11][12]. Various innovations and concepts to increase the productivity and quality of rice production at the farm level are widely available, such as the concept of Integrated Crop Management (PTT) for Rice [20], as well as soybean PTT [3].

The productivity of rice and soybeans in tidal fields is still low. The average productivity of rice is 2-3 tons and soybean productivity is 800-1,300 kg / ha. Meanwhile, the results of research conducted by Yardha et al. [14] were able to provide yields of 1.5-2 tons / ha. The results of research by Adri et al [2] obtained rice yields of 4.1 tonnes / ha. The low productivity is caused by farmers who have not applied technology to eliminate acidic soil pH, high levels of toxic elements (Fe, Mn, and Al), increase low soil fertility, especially N, P, K, Ca and through fertilization and farming institutions that have not optimal.

According to Simatupang and Nurita [14], the use of tidal swamp land to support programs to increase national food production can be carried out, in addition to the large enough land potential to support area expansion programs, technology innovation for new superior varieties, land and water management to support programs to increase rice production in tidal swampland has been produced by the Indonesian Agency for Agricultural Research and Development (IAARD).

Farmers working on commodities of rice and soybean are impressed to fulfill their daily needs. Income has a close relationship with the level of production achieved, if production increases income tends to increase. In addition, the amount of farmer income is also influenced by price. The tidal land cropping pattern is generally rice - secondary crops. Rice cultivation ranges from November to December, while soybean cultivation ranges from May to June each year. The purpose of this study was to analyze rice farming and soybean farming in the swamp tidal land.

2. Materials and Methods

The research was carried out in Harapan Makmur Village, Rantau Rasau District, Tanjung Jabung Timur Regency, Jambi Province in July and June 2020. The research location is a rice and soybean production center area for Tanjung Jabung Timur Regency and Jambi Province. Typology of farm land for rice farming and soybean farming is included in tidal land with overflow typology C.

The survey research method was a case study of farmers who are members of the Bambu Kuning farmer group. Primary data were collected using a questionnaire. Secondary data were obtained from the study literature related to this research.

The data taken was in the form of all input and output of rice and soybean farming carried out by farmers in 2019/2020. Farming input data included all costs incurred in rice farming and soybean farming, both fixed and variable costs. While the output of the results obtained, revenue was calculated the amount of the results obtained multiplied by the selling price.

Fixed costs are costs that do not depend on the amount of production and are not exhausted in one growing season, calculated in rupiah units per hectare per season. Fixed costs in this study included costs incurred to pay land and building tax (PBB) and costs incurred for depreciation of tools used in farming. The formula used in calculating depreciation is:

\[
\text{Depreciation of equipment} = \frac{\text{Purchase value} - \text{Residual value}}{\text{Economic age}}
\]  

Variable costs are costs incurred in rice and soybean farming for the purchase of all production facilities and payment of labor wages, including labor in the family.

2.1 Data analysis

The data that has been collected was tabulated and analyzed descriptively using farm analysis which includes:
2.1.1. Cost Analysis
The total cost (TC) incurred by farmers in rice farming and soybean farming was calculated by adding total fixed costs (FC) with variable total variable cost (TVC) with the following formula [15].

\[ TC = TFC + TVC \] (2)

Where:
- **TC** = Total cost (Total Cost)
- **TFC** = Total fixed costs (Total Fixed Cost)
- **TVC** = Total variable costs (Total Variable Cost)

2.1.2. Revenue Analysis to determine total revenue (TR)
TR is the total amount of production multiplied by the selling price of the production unit obtained by the farmer in carrying out rice and soybean farming using the following formula:

\[ TR = Y \times Py \] (3)

Where:
- **TR** = Total revenue
- **Y** = Amount of production
- **Py** = Production price

2.1.3. Income Analysis
Revenue is total revenue (TR) minus total costs (TC) using the following formula:

\[ \pi = TR - TC \] (4)

Where
- **\( \pi \)** = Income (Rp)
- **TR** = Total revenue
- **TC** = Total costs

2.1.4. Compensation ratio of revenue to cost (R / C)
R / C is calculated to see the feasibility of farming. If the value of R / C < 1 then the farm is said to be losing or not feasible, if R / C = 1 then the farm is said to be unlucky and also not experiencing a loss. Meanwhile, if R / C > 1, then the farm is said to be profitable and worthy of being cultivated.

2.1.5. Break Even Point
Studying the relationship between production costs, sales volume, it can be seen the level of profit and feasibility of rice and soybean farming. One technique in studying the relationship between costs, revenues and production volume is to calculate the breakeven point of production and the breakeven price.

Analysis of the breakeven point of production and the price breakeven point is very important for rice farming in terms of production efficiency. With this analysis tool, it can be seen at what level of productivity the rice farms gain profits, normal profits or experience losses. The break-even point analysis produces an overview of the quantity and minimum price to be produced [12]. TIP and TIH can be broken down as follows:

\[ TIP = Total\ Cost\ (TC) \div Production\ Price \] (5)

\[ TIH = Total\ Cost\ (TC) \div Total\ Production \] (6)
2.1.6. Education level and age

Education level and age as well as the area of land that are responsive farmers. The data on the education level of the respondent farmers was taken, namely the level of formal education that has been attended and completed. While the age of the respondent farmers was taken to determine the level of productive or unproductive age.

2.1.7. The area of cultivated land

The area of cultivated land is the area of land cultivated for rice farming during the rainy season (RS) and the area of land cultivated for soybean farming during the dry season (DS).

3. Results and Discussion

3.1. Characteristics of respondents

Characteristics of respondents could be seen from the aspects of age, education, area of arable land. Respondent farmers' ages range from 32-52 years. Thus all respondents were included in the productive age.

| Age (years old) | Number of people | Percentage (%) |
|-----------------|------------------|----------------|
| 32-37           | 3                | 15             |
| 38-43           | 2                | 10             |
| 44-49           | 3                | 15             |
| 50-55           | 3                | 15             |
| 56-61           | 9                | 45             |
| **Total**       | **20**           | **100**        |

The highest level of education of the respondent farmers was elementary school, namely 13 people or 65%. Then followed by junior high school, farmers senior high school 20% and university education 5%.

| Education level       | Amount | Percentage (%) |
|-----------------------|--------|----------------|
| Elementary School     | 13     | 65             |
| Junior High School    | 4      | 20             |
| Senior High School    | 2      | 10             |
| University Education  | 1      | 5              |
| **Amount**            | **20** | **100**        |

The formal education achieved by farmer respondents at the research location ranged from Elementary School to University. The number of respondents who completed education to elementary school was 13 people or 65%. The number of respondents who completed education to the junior high school level was 4 or 20%, the number of respondents who completed education to the senior secondary level was 2 or 10% and the number of respondents who completed education to the university was only
1 person or 5%. Human resources are one of the resources that do farming in addition to capital, equipment, materials and markets. Human resources are also the most important thing in managing the farm to be able to organize the implementation of the business so that good results will be obtained.

In relation to the education level of farmers, Detik News [7] reports that increasing human resources is not only limited to increasing farmer productivity. However, it also increases the ability of farmers to play a more role in the development process.

3.2. Farming Analysis.

Farm production costs are the sum of fixed costs and variable costs. The cost of rice farming was higher than the production cost of soybean, which was 23%. Rice production costs was Rp. 6,740,000 per hectare, while soybean production costs Rp. 5,460,000/hectare. The fixed cost rice farming was different with fixed cost soybean farming, while variable costs affected production and are used up for one growing season. Fixed costs that are calculated in rice and soybean farming are the costs spent for the payment of land and building tax and depreciation costs from the tools used in rice and soybean farming for one planting season. Variable costs are all costs incurred for the purchase of production facilities and labor. The labor used in rice and soybean farming comes from wage labor and labor in the family. The labor in the family in this farm was still counted as farming expenses. If we look at the percentage of fixed costs compared to variable costs, then fixed costs are far less than variable costs. The variable cost of rice farming is 6.2% and the variable cost was 93.8%. Meanwhile, in soybean farming, the fixed costs were 5.9% and the variable costs were 94.1%.

Table 4. Average Fixed Costs, Variable Costs and Total Costs of Rice and Soybean Farming, Bambu Kuning Farmer Group, Rantau Makmur Village, District Rantau Rasau in 2020.

| Type of Costs | Rice          | Soybean       |
|---------------|---------------|---------------|
|               | Cost ( Rp )   | Percentage ( % ) | Cost ( Rp ) | Percentage ( % ) |
| Fix Cost      | 425,000       | 6.2           | 325,000     | 5.9       |
| Variable Cost | 6,315,000     | 93.8          | 5,135,000   | 94.1      |
| Total Cost    | 6,740,000     | 100           | 5,460,000   | 100       |

The results of the calculation of the minimum volume or amount of production that must be obtained to reach the break even point in one growing season are used the calculation formula TIP = Total Cost (TC) / Production Price, as well as the calculation of the break-even point price with the formula TIH = Total Cost (TC) / Total Production.

Rice farming on tidal fields during the rainy season was feasible because the calculation of R / C < 1 and TIP and TIH was below the production value and the price obtained is lower than the actual production and the selling price of the product received by farmers or in other words the production obtained was above the minimum figure production (TIP) and the selling price was obtained above the minimum price (TIH).

The TIP for rice is 1,465.2 kg/ha and for soybean is 910 kg/ha. That mean if rice production low than 1,465.2 is rice farming suffer losses and production more than 1,465.2 kg/ha the farming is profitable. The soybean farming will be suffer losses when production below than 910 kg/ha and will be profitable when production more than 910 kg/ha.

Table 5. Average Revenue, Income, R / C, TIP and TIH of Rice and Soybean Farmers, Bambu Kuning Farmer Group, Rantau Makmur Village, District Rantau Rasau District in 2020.

| Description | Commodity |
|-------------|-----------|
|             | Rice      | Soybean    |
| Revenue ( Rp /ha ) | 15,065,000 | 7,260,000 |
| Income ( Rp /ha )  | 8,325,000   | 1,800,000  |
| R/C           | 2.23       | 1.3        |
| TIP (kg/ha)   | 1,465.2    | 910        |
| TIH (Rp/kg)   | 2,058.01   | 4,512.4    |
4. Conclusions and Recommendations

4.1. Conclusion
Based on the results of research and discussion, the following conclusions can be drawn:
1. The productivity of rice and soybeans obtained by farmers in the case of this study is still low compared to the genetic potential and the results of research / studies on rice and soybean in tidal fields.
2. The cost of rice farming is 10.5% higher than the cost of cultivating soybeans in tidal land. Likewise, the income of rice farmers was 64.4% higher than that of soybean farming.
3. The yield rate of input from rice farming is 2.23 and the yield rate from input for soybean is 1.3.
4. Rice farming will be profitable if the yield of rice is above 1,465.2 kg / ha and the price is above Rp. 2,058.01 / kg. Meanwhile, soybean farming will generate a profit if the yield of soybeans is above 910 kg / ha and the price is above IDR 4,512.4 / kg.

4.2. Suggestion:
Based on the above conclusions, it is recommended that:
1. Farmers have to strive to increase yields by applying rice and soybean cultivation technology in tidal fields.
2. It is expected that during the harvest season the related agencies will monitor the selling price of rice and soybeans at the farm level in accordance with the price set by the government, so that it will increase farmers’ income.

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