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Income and Feasibility Analysis of Rice Farming: a Case Study of the Food Policy Program (*Upsus Pajale*) Beneficiary Farmers in Jember Regency, East Java Province, Indonesia

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Abstract: ***Indonesia is the third largest rice producer in the world and also rice importer. Therefore, since 2015, the Indonesian government has established the food policy program called Upsus Pajale to improve farmers welfare, increase production, and achieve self-sufficiency. The programs provided various one-time input subsidies for rice farmers. However, in 2022, Indonesia was still a rice-importing country. This paper investigated the income and feasibility analysis of rice farmers. In total 106 rice farmers were interviewed. The results showed that the total revenue of IDR 23,611,915.9 per hectare and a total cost of IDR 10,023,567.3 per hectare, the profit of rice farming was IDR 13,588,348.5 per hectare. The feasibility analysis of the R/C ratio value was 2.5, while the B/C ratio was 1.5. Means that IDR 1 of cost can generate income of IDR 2.5, and IDR 1 of cost can generate benefits or profit of IDR 1.5. In short, rice farming is profitable for farmers. In addition, research found that the largest cost of rice production was spent on labor and fertilizers. Hence, the government should be focused on providing intensive training to facilitate the transfer of technology, so farmers will be able to operate more efficiently.***

Keywords: farm income, feasibility analysis, food policy, rice farming, *Upsus Pajale*

1. Introduction

The Sustainable Development Goals (SDGs) commit to reducing hunger and poverty by 2030(1). The SDGs number 2 target several indicators, including ending hunger, ensuring food access, ending all forms of malnutrition, and doubling the agricultural productivity and income of small-scale food producers (2). Moreover, supporting agricultural development is essential to ensure sustainable food production systems and double the agricultural productivity and incomes of small-scale food producers. Rice is the main staple food for the Indonesians (3). The development of rice became a top priority in food crops. Increased rice production became the government's target to achieve national self-sufficiency. Regarding the data, Indonesia was the rice third largest producers in the world, however, also became an importer of rice. Therefore, the Indonesian government has provided one-time subsidies for rice farmers as one of the targeted commodities of a food policy program called *Upsus Pajale* in Bahasa Indonesia. The program has been promoted since 2015, governed by Republic of Indonesia Ministry of Agriculture's Regulation Number 14 of 2015 (4),and held gradually in all provinces in Indonesia. The program aims to improve the welfare of Indonesian farmers and achieve national food security in four years after it has been implemented.

The programs of *Upsus Pajale* provided rice farmers with input subsidies, including seed, fertilizer, chemicals, and machinery. Additionally, the government also facilitated the agricultural extension officer to guide farmers in order to enhance their farming techniques (5) and boost production (6). According to Ardiansyah (2021), to increase rice income and efficiency in rice farming, the use of machinery at harvest time is very effective in decreasing the intensive use of labor(7).Figure 1 shows that the Indonesian government targeted increasing the national production of rice, but the production was decreasing. The goal of self-sufficiency has not been able to be achieved (8).The lack of farming strategies for using technology and capital are some causes of the agricultural problem for farmers (3).

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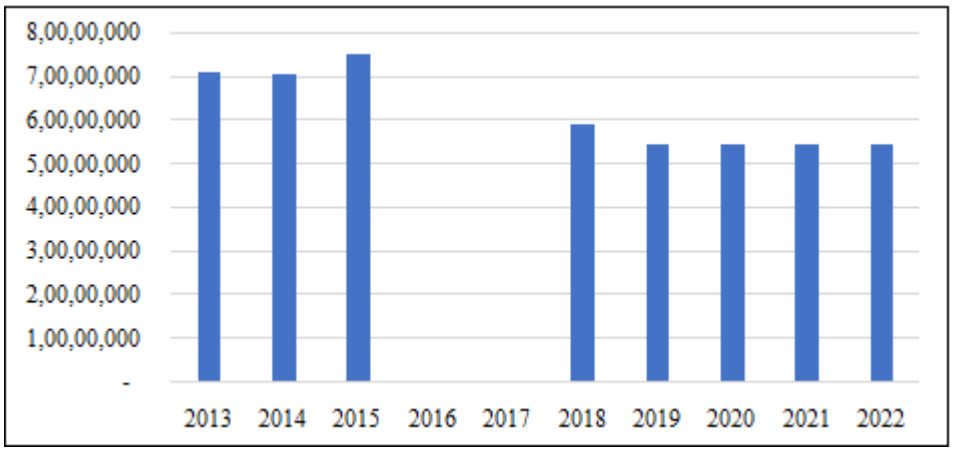

Figure 1: Indonesia rice production.
Source: National Bureau Statistics of Indonesia (BPS), 2023.

In research done by Juhandi (2019) at the macro level using secondary data, it was said that the priority province of rice and other targeted commodities of the program have not improved in production (8). In fact, most rice farming in Indonesia is still done traditionally after decades, and farmers still need to implement a good cultivation strategy in their farming. Therefore, it will be interesting to look at the farm management of rice farmers who are receiving the *Upsus Pajale* program..Furthermore, one of the goals of the program was to increase the farmers' welfare. The farmers' income can have an impact on the level of poverty and household food security of farmers, which is related to the level of farmers welfare (9). Therefore, the aims to evaluate the income and feasibility of rice farming of the rice farmers who received the subsidies from the *Upsus Pajale* policy programs.

2. Literature Survey

Income and feasibility analysis is a good and appropriate method to use to analyze the income and feasibility of a business, including farming. Research conducted by Astika Andi A. et al. (3), used the Revenue-Cost (R/C) and Benefits-Cost (B/C) ratios to evaluate the feasibility of rice farming, which adopted the *Jajar Legowo* cultivated system in Bogor, West Java. The results revealed that the planting system applied by rice farmers obtained an R/C value of 2.07 and a B/C value of 1.07. The meaning of these values indicated that the *Jajar Legowo* system is feasible and able to increase the farmers income.

Abdul Latif et al. (10), evaluate the feasibility of an organic rice farming system in Jombang Regency, East Java, Indonesia. First, the research analyzes the farming income by calculating the total cost and total revenue and using the R/C ratio as an indicator of feasibility for organic rice farms. The results revealed that for production in two planting cycle processes, the total cost for organic rice farming was IDR 23,269,738, consisting of a fixed cost of IDR 8,427,594 and a variable cost of IDR 14,842,143. Furthermore, the total revenue was IDR 31,971,428. The total R/C ratio was 1.374, which means the cost of production of IDR 1 can generate an income of IDR 1.374, so organic rice farming is profitable. Similar research was conducted for rice farming by Oktarian, Lisna, and Melly Yanti (11), who also conducted feasibility studies in Banyuasin District. The results revealed that the R/C ratio was 1.65, which means that the organic farming in the study area was feasible and worthy of consideration.

Setyarini, A. et al. (12), conducted income and feasibility research on rice farming in Keduang, Wonogiry Regency, Central Java, for farmers who cultivated rice in wetland, dry fields or gardens, and dry land. The study revealed that the total cost of farming was IDR 20,773,581/ha/year, and the average revenue was IDR 29,464,858/ha/year. The average income was IDR 8,691,277/ha/year. The value of the R/C ratio was 1.42, which indicates that lowland rice farming is profitable and feasible to develop.

Based on previous research, income and feasibility analysis are good indicators to analyze farming performance. The novelty of this research is that we calculated the farmers who received the support program from *Upsus Pajale*, which, to the author's knowledge, have not been evaluated before. Furthermore, the results of this study could give policymakers information at the microlevel about the farmers income and the feasibility of food policy program beneficiaries. Furthermore, it could explore farming management strategies for the use of inputs. Finally, the analysis could also be an indicator to evaluate the farmers' welfare.

3. Research Method

3.1 Study Area and Sampling Design

The data were collected in Jember Regency, East-Java, Indonesia. East java is the largest production area of rice, and it also was the one of priority province for *Upsus Pajale* policy programs. Jemberis for the highest rice production area compared to other regions in East Java. In Figure 2 showed the map of Jember regency, this study sampling areas were Silo, Mayang, and Ledokombo. These areas were purposely chosen because they have the most farm households and are one of the central production areas of rice farming. Furthermore, they also have similar agro-ecology (rain-fed and irrigation systems) because they are located in one administrative area of agriculture under the one Technical Implementation Unit of the Agriculture

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Department (UPTD) Silo, Ministry of Agriculture in Jember regency. In total 106 rice farmers respondents were interviewed. All the respondents were farmers who received subsidies from the *Upsus Pajale* policy programs. The interviewers conducted from October to December 2016, because this was the time when farmers in the study area received subsidies from the programs. The survey collected detailed information on socio-economic characteristics (i.e., gender, age, education, farming experience, and household size), input and output data. The study was able to explore the assessment of income and feasibility of rice.

Figure 2: Map of Jember Regency, East Java, Indonesia

3.2 Analytical Method

The analytical data were analyzed using quantitative method by calculated the income and feasibility level for each farmer. The formula for each calculation is shown below.

3.2.1 Total Revenue

The total revenue of the rice farmers was calculated by the formula as follows:

$$TC = VC + FC \quad (1)$$

where:
TC = total cost of farming
VC = variable cost
FC = fixed cost.

3.2.2 Total Cost

The revenue of the rice farmers was calculated by the formula as follows:

$$TR = P_y \times Y \quad (2)$$

where:
TR-= total revenue
P_y-= price of yield
Y-= yield

2.2.3 Total Income

Net income was calculated by the formula as follows:

$$\pi = TR - TC \quad (3)$$

where:
π-= profit
TR-= total revenue
TC-= total cost

2.2.4 Feasibility analysis

In this research the feasibility analyses were used two indicators, such as the calculation of revenue and cost ratio (R/C ratio) and the benefit and cost ratio (B/C ratio). First, the formula for R/C ratio were calculated as follows:

$$R/C = TR/TC \quad (4)$$

where:
R/C-= index revenue and cost of farming feasibility
TR-= total revenue
TC-= total cost

There are three criteria of R/C ratio. First, if the R/C ratio is greater than one, it means the rice farming generating more revenue than spending on cost. Second, if R/C ratio is equal to 1 (R/C= 1), it means the rice farming is at breakeven point. However, third, if the R/c ratio less than one (R/C < 1), the rice farming was spending more on cost rather than generating revenue.

The B/C ratio is also a financial ratio used to evaluate the profitability of a business by comparing the benefits of an investment to its costs. In rice farming, the B/C ratio is used to evaluate the profitability of rice cultivation by comparing the benefits of rice production to its costs. The formula for calculating B/C ratio is:

$$B/C = \pi/TC \quad (5)$$

where:
B/C-= index benefit and cost ratio of farming feasibility
π-= profit
TC-= total cost

If the B/C ratio is greater than one (B/C>1), it means that the benefits or profit of rice farming production are greater than the total cost. This indicates that rice cultivation is profitable. If the B/C ratio is equal to 1 (B/C=1), it means breakeven point. However, If the B/C ratio is less than 1, it means that the costs of rice production are greater than its

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benefits/profit. This indicates that rice cultivation is not profitable.

4. Results and Discussion

The descriptive social economic indicators are shown in Table 1. The average farmer's age in this study area was 45 years old. The average level of education was 3.3, which qualified as junior high school. The average education on this study area was pretty good compare to some other are mostly just in Elementary school (10). Education is became important for the farmers, because it will influences the mindset of farmers in developing their farming strategies, especially in absorbing and using modern technology to increase optimal production, the higher the education level of farmers, the higher the farmer's knowledge of technology(10, 13). The family members of the farmers household in study area were 3.5 or equal to 4 members in the family. Furthermore, the average number of years of farming experience was around 22.1 years, the farmers who have more experience in farming usually have better technique in farming and most likely earn more profits. The farms involved were found to be relatively small-scale farmers, with an average of less than one hectare.

Table 1: Descriptive statistics of the social economic variable of Rice farming in Jember

Variables	Unit	Max	Min	Mean	Std. Deviation
Age	years	70	25	45.3	9.32
Education	level	9	1	3.3	2.01
Family size	number	8	1	3.5	1.00
Farming experience	years	50	2	22.1	10.28
Land area	hectare	2.5	0.1	0.7	0.48

4.1 Rice farming income analysis

The farming analysis of this research is shown in Tables 1 and 2. The differences between these two tables are that in Table 1, the conversion result was per hectare per farm household, while in Table 2, the original land size was cultivated by each farm household. If the average production or yield of rice farming in the study areas was 5,834.7 kg/hectare and the average price was about 4,049.5 rupiah/kg, then we could get a calculation for the average total revenue of about IDR 23,611,915.9 per hectare. The average total cost of rice farming in the study area was roughly IDR 10,023,567.3 per hectare, which was almost half of the total revenue that farmers got. The profit from rice cultivation was IDR 13,588,348.5 per hectare.

If we look at the average of the total revenue of rice farming, it seems pretty high; however, if we could see the difference between the minimum and maximum amount, farmers are quite varied. The reasons for this were the differences in the original size of the cultivated land in the study area. It shows in Table 1 that most were smallholder farmers, which makes their efficiency and farm management different from those of farmers with the biggest land. Another problem was that small holders lack capital, so the subsidies program such as *Upsus Pajale* might become one of their capital resources.

The biggest costs of rice farming were labor costs and fertilizer costs. This shows that in Indonesia, most farming systems are labor-intensive, because of the small land size, which makes the use of machinery difficult and inefficient. Consequently, the cost of labor became high, especially during harvesting time. In the case of fertilizer cost, it became the second highest because the farming system in the study area is just planted for rice fields without any rotations for other crops. That is one possible reason why the farmers keep adding more fertilizer to fulfill the soil nutrients.

Table 2: Farming analysis Rice farming per hectare in Jember

Variables	*Unit*	*Max*	*Min*	*Mean*	*Std. Deviation*
Production/ yield	kg	20,000.0	600.0	5,834.7	2,754.4
Product Price (paddy)	IDR/kg	5,700.0	3,500.0	4,049.5	273.6
Total Revenue (TR)	**IDR**	**80,000,000.0**	**2,400,000.0**	**23,611,915.9**	**11,098,848.1**
Fixed cost:					
Rent cost	IDR/farm	10,000,000.0	1,100,000.0	2,452,956.0	1,113,913.7
Variable cost:					
Seed cost	IDR	2,500,000.0	135,000.0	561,047.5	448,495.9
Fertilizer Cost	IDR	4,230,000.0	295,000.0	1,434,225.2	760,114.3
Chemicals Cost	IDR	5,500,000.0	30,000.0	383,447.7	630,392.4
Labor Cost	IDR	7,230,000.0	75,000.0	2,384,510.9	1,254,667.7
Machinery price	IDR	3,000,000.0	26,000	931,883.8	549,201.2
Transportation cost	IDR	1,000,000.0	0	96,081.5	157,890.4
Total Cost (TC)	**IDR**	**21,315,000.0**	**4,100,000.0**	**10,023,567.3**	**3,294,877.4**
Profit	**IDR**	**62,400,000.0**	**(11,440,000.0)**	**13,588,348.5**	**10,654,383.8**

Note: IDR = Indonesian Rupiah

Table 3: Farming analysisRice farming per farmer householdin Jember.

Variables	*Unit*	*Max*	*Min*	*Mean*	*Std. Deviation*
Production/ yield	kg	15,000.0	300.0	4,012.3	2,551.7
Product Price	IDR/kg	5,700.0	3,500.0	4,049.5	273.6
Total Revenue (TR)	**IDR**	**60,000,000.0**	**1,200,000.0**	**16,230,538.7**	**10,378,813.2**
Fixed cost:					
Rent cost	IDR/farm	20,000,000.0	187,500.0	1,764,742.9	2,039,747.3

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Variable cost:					
Seed cost	IDR	2,000,000.0	45,000.0	357,436.3	322,118.2
Fertilizer Cost	IDR	4,650,000.0	147,500.0	927,136.8	628,230.4
Chemicals Cost	IDR	1,750,000.0	7,000.0	218,649.6	228,466.6
Labor Cost	IDR	7,500,000.0	145,000.0	1,548,814.9	1,261,784.7
Machinery price	IDR	3,100,000.0	0	703,282.8	497,517.7
Transportation	IDR	300,000.0	0	53,127.7	64,318.2
Total Cost (TC)	**IDR**	**36,160,000.0**	**844,500.0**	**6,641,242.8**	**4,303,539.4**
Profit	**IDR**	**46,952,500.0**	**(4,577,500.0)**	**9,589,295.9**	**7,808,036.4**

Note: IDR = Indonesian Rupiah

4.2 Rice farming feasibility analysis

The feasibility analysis of the R/C ratio and B/C ratio is shown in Table 4. These analyses were carried out to assess farming's financial viability. Overall, the R/C ratio value of rice farming in the study area was 2.5, which means the farming system meets the criteria of R/C> 1. It means that for IDR 1, the cost of rice farming will generate income around IDR 2.5. In short, rice farming was profitable. This finding is consistent with the funding of Astika Adhi (3, 10-12, 14),

Table 4: Feasibility analysis Rice farming system in Jember.

Variables	Max	Min	Mean
R/C ratio	6.6	0.2	2.5
Benefit ratio = profit/TC	5.6	(0.8)	1.5

The second ratio of feasibility calculations was Benefit-Cost ratio (B/C ratio). The calculation showed that the B/C ratio of the rice farm has a value of 1.05, which meets the criteria of B/C > 1. The meaning of this number is that for each cost incurred of IDR 1, it will generate a benefit of IDR 1.05. Furthermore, the results of the calculation of the feasibility of rice farming systems in the study area can provide adequate income and remuneration for farmers.

5. Conclusions and Policy Recommendation

On a macro level, the food policy program of *Upsus Pajale* that targeted self-sufficiency in rice might not have been achieved; however, the results of the study showed that the average farmer who received the *Upsus Pajale* subsidies program could generate positive income. The feasibility analysis that has been conducted showed that the farming system in the study area was able to provide adequate income and remuneration for rice farmers.

In contrast, there might be some issues for farmers who farm less than 1 hectare. The small-holder farmers seem to be in more unfavorable positions regarding their small profits and somehow facing losses. Particularly in labor costs, which became the highest. Therefore, this research suggests that the government provide the system, which gives another possibility of machine subsidies, not just for tractors, which are practically impossible for farmers to use on their small farms. In addition, the government might also focus on providing more intensive training from agricultural extension officers to guide the farmers in using input properly and efficiently.

6. Future Scope

The author realized that this research has some limitations regarding data collection. The authors were only able to analyze one season of rice farming, which after the farmers received subsidies. In future research the authors suggest that it will be better to compare the income and feasibility of farmers before and after receiving the subsidies program.

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