COMPARISON OF PRODUCTIVITY AND INCOME OF RICE FARMING IRRIGATION SYSTEM ANDRAINFED SYSTEMS IN GORAHUT VILLAGE, SOUTH TAPANULI DISTRICT

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ABSTRACK

This research is to comparison of productivity and income of rice farming Irrigation System and rainfed system, thefeasibility of irrigation and rainfed farming system.. Data analysis methods used are nonprametric statistics test wilcoxon and business feasibility analysis. From the research results obtained: Productivity of irrigated farmers is 3.05 tons / ha and the productivity of rainfed farmers is 2.64 tons / ha. , irrigation farmer income is higher than rainfed farmer where the average of irrigated paddy farmer is Rp7.777.974 / ha and rain-fed farmer is Rp6.107.993. Irrigated wetland rice farming is feasible to cultivate because> 1 where R / C irrigated rice field 2.66 and rainfed 2.06 and B / C irrigated rice 1.66 and rainfed 1.06 means irrigated rice farming is more high feasible than rain-fed rice fields. BEP Production of 1,137,5 kg / ha and rainfed 1,222.37 kg / ha, BEP of irrigated rice paddy rice amounted to Rp1.527,7 / kg and rainfed rice Rp2.316,26 / kg

Keywords: ***Rice, Comparison, Productivity, Income, Feasibility***

A. INTRODUCTION

Agriculture is the most important sector for the nation of Indonesia. Agriculture is the livelihood of most Indonesians. Until now, the agricultural sector as one of the leading sectors of our economy. However, in general, farming is still done traditionally, done on a narrow land and land use are not optimal, you just enough to meet the needs of their own, even sometimes insufficient.

The agricultural sector in the national development order plays an important role because it aims to provide food for the entire population, is also the mainstay of the country's foreign exchange contributor from the non-oil and gas sector. The amount of employment opportunities that can be absorbed and the large number of people who still depend on this sector still need to be developed. Behind the role of the agricultural sector is increasingly important, the state of human resources in this sector are still memperihatinkan because most still relatively low quality. Around 69% of the population in this sector is still classified as poor, of which 82% are in rural areas.

Provision of food needs can not be separated from efforts to increase production, especially in rice plants. Rice productivity in several different areas due to several limiting factors that become obstacles in the utilization of the available land. The productivity level associated with the allocation problem inputs on owned land to produce the expected goal, in terms of the economic organization of farming aims to obtain high profits sought from the availability of existing.

One factor that plays an important role in farming productivity is the availability of agricultural land. Agricultural land is divided into rice fields and non-rice fields. Wetland includes irrigated land, and non-irrigated land that include rainfed areas, tidal wetland, lowland rice fields. Non-rice fields include yards, gardens, fields, grasslands, forests (community forests and state forests), plantations, swamps, ponds. The potential of rainfed lowland is often overlooked because it only has two growing seasons and only relies on rain for irrigation. In fact, the rainfed areas deserve and have considerable opportunities to be developed for rainfed areas of the territory close to the water source and made the development of irrigation facilities will be able to cope with the limited availability of water during the dry season, so the land productivity also increase farmers' income.

To maintain the productivity of rice, the government has poured budget for tertiary network rehabilitation program for Rp446,81 billion in 2014, and in 2015 amounted to Rp2.696.553.900.000. While in 2016 amounted to Rp726.8 billion and 2017 amounted to Rp117.21 billion to increase the intensity of planting. With an increase in cropping index, the increase in annual rice production could increase by 50%. Irrigation is an effort to supply, regulate, and discharge irrigation water to support agriculture, the types of which include surface irrigation, underground water irrigation, pump irrigation, and pond irrigation. "Without water, agriculture will not run well and will not give optimal results. Absolute water for rice farmers. Water is an absolute necessity if you want to increase rice production and achieve rice self-sufficiency.

B. RESEARCH METHODOLOGY

Research methods

The research method used is a case study method, namely research conducted by looking directly at the field. Because the case study is a method of describing the type of research on a specific object during the period, or a phenomenon found in a place that is not necessarily the same as other areas.

Determination Method Research Areas

Determination of the research area was carried out purposively namely intentionally. The study was conducted in Gorahut Village, Aek Bilah District, South Tapanuli Regency. Gorahut village is a rice farming location for irrigation systems and rainfed lowland rice farming. The area was chosen to be the research area because based on the primary data obtained, that area had a rice field farming location for irrigation and rainfed systems.

Sample Determination Method

In this study, the sampling method used is disproportionate stratified random sampling. Sampling of a random member of the population and stratified remain largely the less proportional distribution. Conducted if members of the population are heterogeneous (not similar). The number of samples taken is smaller than the others where the number of irrigated rice farmers is 139 people and rainfed farmers are 20 people. The total population of 159.The sample of 40 farmers, 20 irrigation farmers and rainfed farmers was 20 farmers

Data Analysis Method

To test the hypothesis that (1) is used by means of descriptive analysis or describe the phenomenon of the study area to test the hypothesis, (2) the difference between the productivity and income of paddy farming irrigation system with rainfed lowland rice areas were analyzed by:

a. For production, it is analyzed by comparison, namely by calculating the average production of irrigation system farming with a rainfed system then compared. After that, then analyzed using nonprametric statistics with Wilcoxon test.

With formula :

$$Z = \frac{T-[\frac{1}{4N(N+1)}]}{\sqrt{\frac{1}{24N(N+1)(2N+1)}}}$$

Explanation :

N = A lot of data changes after being treated differently

T = Number of ranks from negative difference values

b. For land productivity, the formula is used:

$$\text{Land Productivity} = \frac{\text{Production (kg)}}{\text{Land area (ha)}}$$

Then compared the average productivity between irrigation system farming with rainfed systems. After that it was analyzed using nonprametric statistics with Wilcoxon test. For income, income analysis is used, namely:

Farming income is the difference between Reception and all costs by the formula:Pd = TR-TC

Explanation :

Pd = Farming Income (Rp)

TR = Total receipts (Rp)

TC = Total costs (Rp)

Farming costs or total cost is the sum of fixed costs and variable costs, can be formulated as follows:

TC = FC+VC

Explanation :

TC = Total costs (Rp)

FC = Fixed cost (Rp)

VC = Variable costs (Rp)

Farm receipts is the multiplication of the production obtained with the selling price, this statement can be written as follows:

TR = Y.PY

Explanation :

TR = Total receipts (Rp)

Y = Products obtained in agricultural products

PY = Price (Rp)

Then compared to the reception and the average income of farmers for rice farming rice fields irrigated with rain-fed farming. After that, it is analyzed by using non prametric statistical test with Wilcoxon test with the following formula:

$$Z = \frac{T-[\frac{1}{4N(N+1)}]}{\sqrt{\frac{1}{24N(N+1)(2N+1)}}}$$

Explanation :

N = A lot of data changes after being treated differently

T = Number of ranks from negative difference values

(Sugiono,2012).

To test the hypothesis (2), analyzed used is Return Cost Ratio (R/C Ratio), B/C dan BEP. R/C Ratio is a comparison between revenue and costs. Mathematically can be written as follows :

$$\text{R/C rasio} = \frac{\text{Total Receipts (TR)}}{\text{Total Cost (TC)}}$$

which:

R/C = Return Cost Ratio

TR = Penerimaan usahatani (Rp)

TC = Biaya total usaha (Rp)

Criteria

a) If R / C> 1 then the farm is said to be feasible

b) If the R / C <1 then the farm is said to be unfit

c) If R / C = then the farm is said to be break even.

B/C ratio = Total Income (FI)
Total Cost (TC)

Which :
B/C = Benefit/Cost Ratio
FI = Total Income (Rp)
TC =Total Cost (Rp)

Criteria
B / C> farming viable
B / C <farming is not viable
B / C = farm is said to break even

Break-even Point Analysis (BEP) Rice farming irrigation and rainfed systems

BEP Production = $\frac{Tc}{p}$

Explanation :
BEP (Q) = Break-even in the productional unit
TC = Total cost
P= Price Per Unit

While the calculation of BEP (Break Event Point) to determine the break-even point on the basis of price in rupiah, receipts can be calculated by the formula:BEP Harga= $\frac{Tc}{Q}$

Explanation :
BEP Price= Break-even in Rupiah
TC = Total Cost
Q = Production (Kg)
(Suratiyah, 2015)

Table. 2. Rice Production Cost Irrigation Systems and Rainfed Per Planting Season

Number	Cost Type	Usahatani Padi Sawah			
		Irrigation (Rp)	Percentage (%)	Rainfed (Rp)	Percentage (Rp)
1	Labor	2.268.500	68,79	3.073.000	73,70
2	Rice Production Facilities	978.285	25,77	1.193.315	24,86
3	Depreciation	176.665	4,65	186.291	3,88
4	Miscellaneous expence	29.250	0,77	32.250	0,67

Source : Primary data after being process

From the table above, it can be seen that the amount of labor costs used by farmers in wetland irrigation systems is Rp.2,268,500 / MT in one growing season. While the labor cost of rainfed rice farmers is Rp. 3,070,000 / MT. It can be seen that the labor costs of wetland rainfed systems are greater than the labor costs of paddy farmers irrigation systems.

Production Facilities

From the table above it can be seen that the average cost of production facilities issued by irrigated rice farmers is Rp.978.285 / MT. While the average cost of production facilities for rainfed rice farmers is Rp1,193,315 / MT. Thus the cost of production facilities for rice farmers is smaller than that of rainfed farmers.

1. Depreciation

Depreciation costs are costs that are known as a decrease in the value of components or devices that are shrinking, namely agricultural equipment. The tools used by farmers in this study were hoes, tripe, rakes, burlap, plastic and spray pumps. The average depreciation cost of irrigated rice farmers is Rp. 176,665 / MT. While the average depreciation of rainfed rice farmers is Rp. 186,291 / MT.

2. Miscellaneous expense

In this study, there are some that are included in research in other costs ie transportation costs and the cost of property taxes is good for paddy rice farming and farming irrigation systems rainfed lowland rice. The average cost of other irrigated rice farmers is Rp. 29,250 / MT. While the average cost of other rainfed rice farmers is Rp. 32,250 / MT.

Comparative Analysis of Irrigated Rice Fields and Rainfed Rice Fields Per / Ha

Table. 3. Productivity Differences and Income of Wetland Irrigation and Rainfed Systems Per Hectare

Number	Description	Irrigation	Rainfed
1	Production (Kg/Ha)	3.054	2.637
2	Produktivity (Ton/Ha)	3.05	2.64
3	Revenue (Rp/Ha)	12.441.844	10.348.988
4	Production Cost (Rp/Ha)	4.663.780	5.011.20

5	Income (Rp/Ha)	7.777.974	6.170.993

Source : Primary data after being processed

From the table above it can be seen that the average productivity of irrigated rice farmers is 3.05 tons / ha in one planting season. While the average productivity of rainfed lowland rice farmers is 2.64 tons / ha in one planting season. Thus it can be seen that the productivity of paddy farmers is higher than the productivity of rainfed lowland rice farmers. This means that there is a difference in the productivity of rice farmers in irrigation systems with rainfed rice field farmers.

The results of the statistical analysis of non prametric test of Wilcoxon match pairs test the productivity of rice farmers, irrigation systems and rainfed rice fields.

Wilcoxon Signed Ranks Test

Test Statistics(b)

	Rainfed Productivity– Irrigation Productivity
Z	-3,061(a)
Asymp. Sig. (2-tailed)	,002

a Based on positive ranks.
b Wilcoxon Signed Ranks Test

Based on the statistical test output, it is known that the Wilcoxon Signed Rank Test, the value of z value obtained is -3.061 with p value (Asymp. Sig 2 tailed) of 0.002 which is smaller than 0.05 so that the hypothesis is accepted or that means there is a difference between farmer productivity rice paddy irrigation systems and rain-dependent farmers.

Wilcoxon Signed Ranks Test

Test Statistics(b)

	pendapatan tadah hujan - pendapatan irigasi
Z	-2,352(a)
Asymp. Sig. (2-tailed)	,019

a Based on positive ranks.
b Wilcoxon Signed Ranks Test

Based on the statistical test output it is known that the Wilcoxon Signed Rank Test, the value of z value obtained is -2.352 with p value (Asymp. Sig 2 tailed) of 0.019 which is smaller than 0.05 so the hypothesis is accepted or that means there is a difference between farmers' income rice paddy irrigation systems and rain-dependent farmers

From the table above, it can be seen that the average income of rice farmers in the irrigation system is Rp. 7,777,974 / Ha in one growing season. Whereas the average income of wetland rice farmers is Rp. 6,170,993. Thus the income of paddy farmers in the irrigation system is higher than that of rainfed farmers. This means that there is a difference in the income of paddy farmers in the irrigation system with rainfed rice field farmer

Feasibility Analysis of Rice Farming Systems Irrigation and Rainfed / Ha

Table. 4. Feasibility of Rice Field Irrigation and Rainfed

Number	Description	Irrigation	Rainfed
1	Production (Kg/Ha)	3.054	2.637
2	Productivity (Ton/Ha)	3.05	2,64
3	Revenue (Rp/Ha)	12.441.844	10.348.988
4	Production Cost (Rp/Ha)	4.663.780	5.011.720
5	Income (Rp/Ha)	7.777.974	6.107.993
6	**R/C**	**2,66**	**2,06**
7	**B/C**	**1,66**	**1,06**
8	**BEP Production (Kg/Ha)**	**1.137,5**	**1.222,37**
9	**BEP Price (Rp/Kg)**	**1.527,1**	**2.316,26**

Source : Primary data after being processed

From the table above it can be seen that the highest R / C ratio in wetland rice farming systems is 2.5. Whereas in the wetland rice farming system, the rainfed system is 2.03. The R / C ratio is strongly influenced by the amount of revenue and the total costs incurred by farmers. The R / C ratio obtained is more than 1, then the paddy field irrigation system and rainfed rice system are feasible.

Based on the table above, it can be seen that the highest B / C ratio in lowland rice farming is 1.51. Whereas the B / C ratio in the rainfed lowland rice farming system is 1.03. The B / C ratio is strongly influenced by the amount of total income and the total costs incurred by farmers. The most B / C ratio obtained is more than 1, then irrigated rice farming irrigation systems and rainfed lowland rice systems deserve to be cultivated. Based on the table above it can be seen that the BEP of paddy production in irrigation systems is 1,211.54 Kg / Ha. Whereas the BEP of wetland rice production system is 1,237.75 / Rp / Kg. BEP production is influenced by the amount of production and production costs, meaning that it is lower than the selling price of grain of Rp. Kg, this shows that rice farming irrigation and rainfed systems are very profitable.

Based on the above table it can be seen that the BEP price of paddy rice farm irrigation systems amounted to 1626.5. While the BEP price of paddy rice farming is rainfed, at 1924.45, meaning lower production so it shows that rice. farming rice fields irrigated and rainfed systems profitable.

C. CONCLUSION

1. There are differences in the stages of farm management among farmers of paddy irrigation systems to farmers rainfed lowland rice is in the seedbed and the use of water for the plant.
2. There are differences in productivity and farm income among farmers of paddy irrigation systems by farmers' paddy rice productivity rainfed paddy rice farm irrigation system is at 3:05 Ton / Ha. While the productivity of lowland rainfed system is 2.64 tons / ha. And the income of irrigated rice farmers is Rp.7,777,794 / Ha, while the income of wetland rice farmers is Rp6,107,993 / Ha, indicating that the average income of irrigated rice farmers is higher than that of rainfed rice farmers.
3. Paddy rice farm irrigation systems and rain-fed feasible to be developed for the R / C and B / C> 1 where R / C farming irrigated fields, namely 2.66 and R / C rainfed rice 2.06 and B / C irrigated rice paddy 1.66 and 1.06 of rainfed lowland rice, this suggests is feasible diusahkan but farming rice paddy irrigation systems more profitable.

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