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Difference Between Productivity and Income of Rice Farming Between Semi-Technical and Simple Irrigated Rice Fields in Baubau City

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ABSTRACT

Water is one the determining factors in the process of agricultural production. In meeting the needs of water for various farming needs, it must be given in the right amount, time, and quality, otherwise the growth of plants will be disrupted so that it will affect the production, productivity and income of farmers. The purpose of this study is to analyze the differences in productivity and income of farmers who work on semi-technical irrigated rice fields with farmers who work on simple irrigated rice fields in Baubau City. The population in this study were 214 farmers, 102 farmers with semi-technical irrigation and 112 farmers with simple irrigation. For the purpose of this research, 25 farmers were taken from each of the two irrigation categories. Data analysis with a different test (t test). The analysis shows that there is a very significant difference between the productivity and income of farmers who work on semi-technical irrigated rice fields and those who work on simple irrigated rice fields for productivity. While the income is (7744621.9057> 2,485) at 99% confidence level.

Keywords: *difference productivity, income, semi-technical, simple irrigated*

1. INTRODUCTION

Water is one of the determining factors in the process of agricultural production. Therefore, irrigation investment is very important and strategic in the context of water supply for agriculture. In meeting the needs of water for various farming needs, then water must be given in the right amount, time, and quality, otherwise the plants will be disrupted, which in turn will affect agricultural production.

Irrigation system management at the farm level has been stipulated in the legal basis viz Government Regulation No. 20 of 2006 concerning Irrigation. The legal basis is emphasized that "Tertiary irrigation system management is the right and responsibility of the water user farmer association". That is, all the responsibilities of developing and managing irrigation systems at the tertiary level become the responsibility of the water user farmer association organizations, in some areas known as Mitra Cai, Subak, HIPPA, Dharma Tirta are including farmers' groundwater user associations (P3AT). For this reason, there is a need for a strong, independent and empowered AI user farmer association (P3A) so that development and management irrigation systems can be implemented well and sustainably, and ultimately able to increase agricultural productivity and production in support of efforts to improve the welfare of farmers and national food security [1].

Providing irrigation water from upstream to downstream requires adequate irrigation facilities and infrastructure. The facilities and infrastructure can be in the form of: dams, bends, primary and secondary channels, divide boxes, measuring buildings, and tertiary channels and farm level channels. Disruption or damage to one of the irrigation structures will affect the performance of the existing system, resulting in decreased efficiency and effectiveness of irrigation. If this condition is allowed to continue and is not immediately addressed, it will have an impact on the expected decline in agricultural production, and have a negative impact on farmers' income conditions and socio-economic conditions around the site source from the Directorate General of Infrastructure and Agricultural Facilities, 2011.

The existence of infrastructure conditions in supporting the development of rice agribusiness, is more emphasized on the availability of land and water. In connection with the availability of land for rice development in the City of Baubau, it is more directed at paddy fields and specifically in Bungi District, the area of paddy fields that had been cultivated in 2010 was 1,168 Ha. In line with the availability of land, the irrigation system is a major factor in supporting the development of wetland rice farming, bearing in mind the commodity of wetland rice is highly dependent on the availability of water in each phase of its growth. In the area of rice development centers in the City of Baubau area there is irrigation sourced from water reservoirs and rivers. For example, in Ngkaringkari Village, Bungi District.

The water needs in Ngkaringkari Urban Village for farming, especially rice plants, are derived from technical irrigation originating from the Wonco River Dam or known as the Wonco I Dam which irrigates the Subak Bali Sari area through 2 primary channels and 4 secondary channels, while the Wonco II Dam irrigates Subak Pure Sari area through 2 primary channels and 7 secondary channels. The construction of these canals is entirely permanent, so that the water smoothly reaches the farmers' rice fields through the tertiary channels in each group. One of the problems in

relation to the use of irrigation water is the lack of water discharge in the dry season. After studying the data on water discharge from irrigation in Ngkaringkari, it turns out that the condition of irrigation water tends to decrease.

The area of rice fields in Baubau City according to the type of irrigation for Bungi District is technical irrigated rice fields that is 615 Ha, semi-technical irrigated rice fields are 117 Ha, simple irrigated rice fields are 137 Ha, while Village irrigation is 193 Ha. While without irrigation that is for rainfed as much as 74 hectares and others as much as 32 hectares so that the overall total is 1,168 hectares for the area of paddy fields in Bungi District where rice is planted on average twice a year. Sources from the Department of Agriculture and Forestry of the City of Baubau, 2010.

The purpose of irrigation can be done directly and indirectly. The purpose of direct irrigation is to wet the soil, so that a good soil condition for growth is achieved plants in conjunction with percentage of water and air content in between soil grains. Provision of water can also has the purpose as a carrier of fertilizer materials for soil improvement. Purpose Irrigation indirectly is a gift water that can support agricultural business through various ways including: regulating soil temperature, clean the soil, and heightens groundwater level [2].

Simple irrigated fields are rice fields whose water sources are from other places (generally in the form of springs) and the channels are made simply by the farming community local, without buildings permanent [3].

Semi-technical irrigated paddy fields are irrigated rice fields comes from semi technical irrigation networks, semi technical irrigation itself is Network irrigation which has permanent or semi-permanent tapping buildings, generally already equipped with a take and gauge building, but the distribution system not yet fully able to regulate and measure, so that more organization complicated [4].

In most cases, the only difference between simple irrigation networks and tissues semiteknis is that the latter the weir is located on the river complete with retrieval and building gauges in parts downstream. Maybe some were also built permanent building in the channel network. System water distribution is usually similar to tissue simple. It is likely that retrieval is used to serve a wider area than a simple network service area. Therefore, the costs are borne by more service areas. The organization is more complicated and if the permanent building is a retrieval building from the river, more government involvement is needed [5].

Primary channels are channels that carry water from tapping buildings to secondary channels and to irrigated tertiary plots. The boundary end of the primary channel is the building for the latter. A good primary channel will be able to meet the water needs of the land that will be irrigated. In civil engineering, a good building has two important requirements, namely good quality and economical. This applies not only in terms of planning multi-storey buildings or highways, planning for waterways must also be the case. The water channel referred to here is the water channel for irrigation purposes, among other things is the primary channel [6]

Rice is a basic need for the majority of Indonesian people and most of the population works as farmers. But the need for community rice is still insufficient. According to Kecuk Suhariyanto, Head of the Central Statistics Agency, rice has become the biggest commodity on the line poverty in Indonesia, both urban and rural. To reduce rice poverty it is necessary to increase rice production by taking into account the factors that play a role in increasing rice production yields such as water use [7].

In conducting farming, whoever always tries to get the harvest increased. Economic science is not directly farmers compare between results which is expected to be received on time harvest with all costs incurred for processing rice fields. Results obtained Farmers at the time of the harvest are called "Production", while the costs incurred called "production costs" [8].

Increasing crop production, especially rice, of course the irrigation approaches the systems have a role which is very large in an effort to increase production on paddy fields so that productivity and income increase when supported by the presence of irrigation. This is certainly interesting to be studied scientifically through research because researchers want to know with certainty, how much difference in productivity and income earned by farmers when cultivating rice plants in semi-technical and simple irrigated rice fields. For this reason, the researchers base their analysis on the differences in productivity and income of farmers who work on semi-technical irrigated rice fields and farmers who work on simple irrigated rice fields in Ngkaringkaring Village, Bungi City, Baubau District.

2. METHOD

This research was conducted in Ngkaringkari Village, Bungi District, Baubau City, which lasted from May to July 2019. The population in this study were all farmers in Ngkaringkari Urban Village who specialized in growing rice with semi-technical irrigation, amounting to 102 people and simple irrigation that is 112 people so the total population is 214 people. In determining the sample, stratified random sampling or stratified sampling was taken by taking 25 rice farmers using semi-technical irrigation and 25 rice farmers using simple irrigation as respondents from the total number of rice farmers. Thus, the total number of respondents was 50 people. According to Arikunto, if the total population is less than 100 people, then the total sample is taken, but if the population is greater than 100 people, then it can be taken 10-15% or 20-25% of the total population [9].

The calculation of acceptance uses the formula, namely: TR = p x Py Where: TR: Total Revenue P: Production obtained during the production period Py: Price of production. Then to calculate the costs used the formula: TC = TFC + TVC Where: TC = Toral costs of farming in the period of farming TVC = The amount of costs in the form of variable costs TFC = The amount of costs in the form of fixed costs to calculate profits used the formula: π = TR-TC Where π = profit or profit TR = Total TC Revenue = Total Cost [10].

To find out productivity by the formula:

$$Farming\ Productivity = \frac{Production\ Amount\ (Kg)}{Land\ Area\ (Ha)}$$

To find out the differences in productivity and income used a different test (t test) with the formula:

$$t - count = \frac{X1\ average - X2\ average}{\sqrt{S1^2/n1 + S2^2/n2}}$$

$$S12 = \frac{\sqrt{(n1-1)S1^2 + (n2-1)S2^2}}{n1+n2-2}$$

Where:

$\overline{X_1}$ = Productivity or income of semi-technical irrigated rice farmers

$\overline{X_2}$ = Productivity or income of simple irrigated rice farmers

n_1 = Number of farmers samples in semi technical irrigated paddy fields.

n_2 = Number of sample farmers in simple irrigated paddy fields.

S_{12} = Standard deviation combined

Test Criteria:

- If t arithmetic ≥ t table at the 95% confidence level (α = 0.05), it means that the difference is significant (significant) or the hypothesis can be accepted.
- If t arithmetic <t table at 95% confidence level (α = 0.05), it means that the difference is not real or the hypothesis is rejected.
- If t arithmetic ≥ t table at 99% confidence level (α = 0.01), it means that the difference is very significant [11].

3. RESULTS AND DISCUSSION

3.1. Production

The intended production is grain that has been processed into rice produced by the respondent's farmers within one harvest season. The level of rice production of respondent farmers in Ngkaringkaring Village, Bungi District, Baubau City, can be seen in Table 1.

Table 1 Production Rate of Respondent Farmers in Ngkaringkaring Village, Bungi District, Baubau City in 2019

No	Rice Production Rate (Kg/ha/ Planting Season)	Semi Technical Irrigated Rice Fields		Simple Irrigated Rice Fields	
		amount (person)	(%)	amount (person)	(%)
1.	861 – 1841	17	68	15	60
2.	1842 – 2821	8	32	10	40
Amount		25	100	25	100

Table 1 shows that respondent farmers who worked on semi technical irrigated rice fields and those who ran simple irrigated rice fields had an average production of 861-1841 kg /ha (68%) and (60%) while those with rice production between 1842 - 2821 kg/ha, respectively (32%) and (40%). This condition is caused by the area of arable land by farmers that varies between one respondent farmer and another respondent farmer, in addition it also depends on the treatment done by the respondent farmer on his farm, in an effort to increase soil fertility. The resulting production is also influenced by the use of production facilities, such as fertilizers, medicines that are not optimal, the use of superior seeds, planting techniques and pest control and disease in an integrated manner or that is known as the handling of good and sustainable plant cultivation.

3.2. Production Costs

Production costs are all expenses incurred by farmers for farming needs which are valued in cash (rupiah). Production costs referred to in this study are all costs incurred by farmers during farming activities. In this case the costs incurred are only fixed costs and variable costs. For more details about the costs incurred by the respondent farmers in rice farming are presented in Table 2 as follows:

Table 2 Production Costs of Respondent Farmers' Rice in Ngkaringkaring Village, Bungi District, Baubau City in 2019

No.	Total Production Costs (IDR/kg)	Semi Technical Irrigated Rice Fields		Simple Irrigated Rice Fields	
		Amount (person)	(%)	amount (person)	(%)
1.	798000 - 964000	16	64	16	64
2.	964001–1130000	9	36	9	36
Amount		25	100	25	100

Table 2 shows that farmers who need the highest production costs from those who operate semi-technical irrigated rice fields and those who operate simple irrigated rice fields, show the highest total production costs, namely between IDR 798000 - IDR 964000 per kilogram or 64% each.

3.3. Revenue

The income obtained by respondent farmers in this study is revenue minus production costs used during the growing season. For more details about the income of farmers respondents are presented in Table 3.

Table 3 Situation of Respondent Farmers by Income Level in Ngkaringkaring Village, Bungi District, Baubau City in 2019

No	Farm Income Level (IDR/ha)	Semi Technical Irrigated Rice Fields		Simple Irrigated Rice Fields	
		Amount (person)	(%)	Amount (person)	(%)
1.	3616200-9368100	16	64	19	76
2.	9368101-15120000	9	36	6	24
Amount		25	100	25	100

From Table 3 above it appears that the respondent farmer has the highest net income from rice farming either using semi-technical irrigation or simple irrigation is between IDR 3616200 - IDR93681000/planting season, each the

percentage is 64% and 76%. This shows that meeting the minimum daily needs is more than enough.

3.4. Farm Analysis

Based on the results of income analysis to find out the income differences between farmers who work on semi-technical irrigated rice fields and those who work on simple irrigated rice fields in Ngkaringkaring Village, Bungi District, Baubau City, the following results are obtained:

a. Analysis of Income of Farmers who Seek Semi Technical Irrigated Rice Fields and Who Seek Simple Irrigated Rice Fields in Ngkaringkaring Village, Bungi District, Baubau City.
   Based on the results of data analysis to determine the level of income of farmers working on semi-technical irrigated rice fields per planting season, the following results are obtained:
   Net Income = IDR 4,779,000 to IDR 21,193,000
   The results of data analysis to determine the level of income of farmers who seek simple irrigated rice fields per planting season, the following results are obtained:
   Net Income = IDR 3,568,200 to IDR 13,410,000
   This fact shows that there is a close relationship between the level of income of farmers who are working on semi-technical irrigated rice fields and those who are working on simple irrigated rice fields in Ngkaringkaring Village, Bungi District, Baubau City.
b. Difference Test (t-Test Analysis)
   The results of the study are known to the difference in productivity and average income of wetland rice farming which operates semi-technical irrigated rice fields and those who seek simple irrigated rice fields in Ngkaringkaring Village, Bungi City, Baubau District, respectively 494.50667 Kg/Ha and IDR 4,394,726.4/Kg, thus both productivity and income of rice farmers who are working on semi-technical irrigated rice fields are greater than those who are working on simple irrigated rice fields.

Different test is used to find out the difference between income and productivity of wetland rice farming between those who work on semi-technical irrigated rice fields and those who work on simple irrigated rice fields. From the results of t-test calculations, the results obtained where the t-test is greater than t-table, namely (7744621.9057> 2.485) at a 99% confidence level. This means that the level of income from wetland rice farming between those who are working on semi-technical irrigated rice fields and those who are working on simple irrigated rice fields is significantly different. Thus, the hypothesis can be accepted. While the results of the t-test calculation (appendix 6), obtained results where the t-test is greater than t-table, namely (12.5026> 2.485) at a 99% confidence level. This means that the level of productivity of wetland rice farming between those who are working on semi-technical irrigated rice fields and those who are working on simple irrigated rice fields is very different too, so that the proposed hypothesis can be accepted

4. CONCLUSION

Based on the results of the analysis and discussion, several conclusions can be made, namely: (1) Productivity and income of rice farmers who work on semi-technical irrigated rice fields is greater than the productivity and income obtained by farmers who work on simple irrigated rice fields. This is shown from the results of the analysis of productivity and average income of farmers who work on semi-technical irrigated rice fields, which is 1865.12 kg/ha is greater than the productivity of farmers who seek simple irrigated rice fields, which is 1370,61333 kg/ha. Similarly, farmers who are working on semi-technical irrigated rice fields, namely IDR 12,620,288.4, - is greater than the income of farmers who work on simple irrigated rice fields, namely IDR 8,225,562, -; (2) Difference in productivity and average income of wetland rice farming which operates semi-technical irrigated rice fields and those who operate simple irrigated rice fields in Ngkaringkaring Sub-District, Bungi City, Baubau District, respectively 494.50667 Kg/Ha and IDR 4,394,726.4/Kg; (3) The results of the different test analysis show that there is a very significant difference between the productivity and income of farmers who work on semi-technical irrigated rice fields and those who work on simple irrigated rice fields, the results of t-test calculations are obtained results where the t-count is greater than t-table, i.e. (12,506> 2,485) at the 99% confidence level, for productivity. While the income is (7744621.9057> 2,485) at 99% confidence level.

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