Jurnal Bisnis Tani
AGRIBISNIS - UNIVERSITAS TEUKU UMAR

Bisnis Tani, Vol. 11, No. 2, Tahun 2025
https://jurnal.utu.ac.id/jbtani
ISSN 2477-3468 (print), 2714-7479 (online)
DOI: 10.35308/jbt

ANALYSIS OF IRRIGATED LOWLAND RICE FARMING EFFICIENCY IN JUWIRING DISTRICT

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Abstract

Agricultural development is an effort to improve the standard of living of farmers, business opportunities, expand employment, and increase income, as well as expand markets both domestically and abroad. This can be achieved through advanced, efficient and resilient agriculture so as to increase yields, improve quality and support regional development. The purpose of this study was to analyze the efficiency, income of rice commodity farming businesses in Juwiring District, Klaten Regency against irrigated rice fields. The research method used is the purposive sampling method. Data analysis uses farming business analysis in the form of efficiency analysis, income analysis and costs of irrigated rice farming. The results of this study indicate that irrigated rice fields in Juwiring District have an average income obtained by irrigation in Juwiring District of Rp 8,394,892.75 / Ha. Farming costs obtained by irrigated rice farmers amounted to 11,102,026.37 / Ha. The efficiency of irrigated rice farming businesses in Juwiring District is Rp 1.83. It can be concluded that irrigated rice farming in Juwiring District is feasible for farmers because R/C is more than 1 so that the irrigation farming carried out is efficient or feasible.

Keywords: *Efficiency, Income, Paddy Fields, Irrigation*

1. INTRODUCTION

Agricultural development is an effort to increase income, improve farmers' living standards, expand employment and business opportunities, as well as broaden markets both domestically and internationally. This can be achieved through advanced, efficient, and resilient agriculture that is capable of increasing yields, improving quality, and supporting regional development (Soekartawi, 2006).

The success of this policy was evident in 1984 when Indonesia achieved self-sufficiency in rice production and demonstrated strong food security (reaching food self-sufficiency). However, limited land and other productive resources potentially force farmers to become wage laborers within the system, which ultimately leads to structural poverty. When food prices are high, farmers with low

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wages are no longer able to meet their nutritional needs. This situation contributes to the rising cases of malnutrition in Indonesia. In the end, poverty and hunger inevitably become major problems (Puspadi, 2005).

Rice is one of the leading food crop commodities in Indonesia. According to the Central Bureau of Statistics (2019), the population of Indonesia reached 267 million people with an annual growth rate of 1.33% between 2010 and 2018. Data from the Central Bureau of Statistics (2020) show that total rice production in Indonesia in 2019 was 54.60 million tons of dry harvested grain (GKG), a decrease of 4.60 million tons (7.76%) compared to 2018. The harvested area of rice in 2019 also declined by 700.05 thousand hectares (6.15%). Land area is the most responsive variable in efforts to increase rice production, thereby improving the income of paddy farmers. However, strong capital support is required, as the larger the land area owned by rice farmers, the greater the amount of capital needed to produce rice (Rahayu, 2021).

Rice production tends to increase over time. Production refers to goods or services that undergo a process called input, which is then transformed into goods or services known as output. This production activity involves modifying or generating new goods. The production process requires several inputs such as labor, capital, and equipment or machinery. Rice production, therefore, refers to an activity that uses inputs such as agricultural facilities and infrastructure in farming practices with the aim of producing an output, namely unhusked rice (gabah). Rice production will continue to rise in line with population growth (Yogatama, 2019).

Rice is the staple food for the majority of the population. An increase in income will also lead to a higher demand for food, particularly rice. Therefore, it is necessary to improve the productivity of paddy farming to meet the growing need for rice. Rice has become a leading food commodity widely consumed by the Indonesian people. The selling price of rice also influences the attitudes of rice farmers. This phenomenon often leads farmers to store their harvest and delay sales, as the market price has not yet met their expectations (Suripto & Imam, 2023).

Poverty is a serious problem in the national economic development process. Various efforts have been implemented to address this issue. The unequal distribution of prosperity across various levels of society, especially in rural areas, poses a challenge for the government to ensure equitable distribution of prosperity across all levels of society. (Diatmika & Rahayu, 2021)

A number of economic problems are complex and require appropriate management. These include poverty, low income, unemployment, and slow economic growth. (Khotimah, 2018). By identifying the efficiency point of farming, specifically production costs, farmers' welfare will improve, poverty reduction among rice farmers will be reduced, and land productivity will be increased. The efficiency analysis will examine the efficiency level of rice farming in Juwiring District, which can then serve as recommendations for future rice farming policies.

In accordance with the theory of supply and demand, price increases can cause changes in consumer behavior. Consumer behavior refers to the direct activities of individuals involved in obtaining and using goods and services, including the decision-making process in preparing and determining the activities to be undertaken (Sinulingga et al., 2023). Thus, while rising prices may

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benefit paddy farmers, as rice consumers, people will adjust their choices by purchasing rice varieties with lower prices.

In relation to the background of the problem described above, the research questions can be formulated as follows:

1. What are the costs, revenues, and income of irrigated lowland rice farming in Juwiring District, Klaten Regency?
2. How efficient is irrigated lowland rice farming in Juwiring District, Klaten Regency?

The problem is addressed using farm management theory. The concept of cost in this study refers to production costs. Efficiency is analyzed using the concept of farm efficiency through the Revenue-Cost Ratio (R/C Ratio). The R/C Ratio is defined as the comparison between farm revenues and farm costs. This analysis aims to determine the costs, income, profit, and efficiency of irrigated lowland rice farming in Juwiring District.

2. MATERIALS AND METHODS

2.1 Materials

2.1.1 Primary Data

Primary data are actual data obtained directly from the first source, either from individuals or groups. These data were collected through interviews, recall, and other similar methods. The primary data in this study include farmer characteristics (age, gender, education, farming experience), farm characteristics (land area, type of seeds, fertilization, pesticides), as well as production and harvest data (quantity, selling price, and income). The rice farmers referred to are the owner-cultivator farmers. The research period was 1 planting period, First Planting Season (MT I) 2024.

Rice Farming Costs:

1. Production input costs, which include:

a. Cost of purchasing seeds or seedlings

b. Cost of purchasing fertilizer

c. Cost of purchasing chemical pesticides

2. Cost of external and internal labor

3. Income Analysis, Farm income is the total value of the produce received by farmers in a single growing season. This income is obtained by multiplying the price of paddy rice by the quantity of paddy rice produced, expressed in rupiah per growing season.

4. Farm income from irrigated lowland rice cultivation is the difference between total revenue and total farming costs. Income is the difference between revenue and explicit costs incurred in rice farming activities during one planting season, expressed in rupiah per planting season.

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5. Farm Efficiency

2.1.2 Secondary Data

Secondary data are data used to complement or support primary data, obtained from second, third, or subsequent sources. The sources of secondary data include literature studies, books, previous research, as well as relevant institutions such as the Central Bureau of Statistics and the Department of Agriculture. Secondary data may consist of information such as land area, farmer population, rice production volume, and others.

2.2 Methods

2.2.1 Sampling Method

The selection of the research location was carried out using the purposive method, or deliberate selection, based on specific considerations. According to Singarimbun and Efendi (2008), purposive sampling refers to the selection of a research location based on certain considerations determined by known characteristics or attributes relevant to the objectives of the study.

a. Selection of Sample Villages

The determination of sample areas in the villages of Juwiring District was conducted deliberately by considering the criteria of villages with the largest harvested area of irrigated paddy fields in the district.

b. Method of Selecting Farmer Samples

Singarimbun and Efendi (2008) state that if data are analyzed using parametric statistics, the sample size should be sufficiently large to follow a normal distribution. A sample is considered normally distributed if the number of samples is ≥ 30. The determination of sample villages was carried out deliberately, by considering the villages with the largest number of farmers in Juwiring District. Based on the consideration of the largest production area, the selected villages were Trasan, Mrisen, and Sawahan.

The determination of sample villages was carried out deliberately by considering the villages with the largest number of farmers in Juwiring District. Based on the consideration of the widest production area, the selected villages were Trasan, Mrisen, and Sawahan.

The determination of the number of farmer samples from each village was conducted using the proportional random sampling method, in which the number of samples taken followed the proportion of farmers in each sample village. The total number of samples in this study was 30 irrigated paddy farmers from Trasan, Mrisen, and Sawahan Villages (Nazir, 1988).

a. Analysis of Cost, Revenue, Income, and Efficiency

Cost is defined as the value of all inputs used in the production process, both consumable inputs and non-consumable inputs. Cost can also be referred to as the expenditure incurred by a business activity to fulfill production factors. Farm production cost refers to the cost or value of inputs used in farming activities with the aim of obtaining maximum profit (Widyantara, 2018).

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1. Cost Analysis

The concept of cost in this study refers to production costs. Production costs are the actual expenses incurred during the production process by farmers in a single planting season. These consist of expenditures for production inputs, including the cost of seeds, fertilizers, chemical pesticides, hired labor, family labor, and other expenses such as ceremonial costs, land tax, depreciation, and transportation. Labor is labor outside the family who manages rice paddy farming. All labor is converted into male labor and measured in HKP, while the value of labor is based on wages and expressed in rupiah (Rp/HKP). The formula is expressed as follows :

TC = cost of production inputs (cost of seeds + cost of fertilizers + cost of chemical pesticides + hired labor cost + family labor cost + other expenses (ceremonial costs + transportation + depreciation + land tax)

Explanation :

TC = Operating Cost (Rp)

2. Income Analysis

Revenue is defined as the product of the quantity of paddy rice sold and its selling price, formulated as follows :

TR = Q x P

Explanation :

TR = Total Revenue of Paddy Farming (Rp)

Q = Quantity of Paddy Production (kg)

P = Price of Paddy Product (Rp/kg)

3. Farm Income Analysis

Farm income from irrigated lowland rice cultivation is the difference between total revenue and total farming costs, formulated as follows :

Pd = TR – TC

Explanation :

Pd = *Farm Income of Irrigated Lowland Rice* (Rp)

TC = *Total Cultivation Cost of Irrigated Lowland Rice* (Rp)

TR = *Total Revenue*/ Total Revenue of Paddy Farming (Rp)

3. Farm Efficiency

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The R/C Ratio is defined as the comparison between farm revenue and farm cost. Mathematically, it can be expressed as follows :

$$\text{Efficiency of Paddy Farming (R/C } \textit{Ratio} \text{) } = \frac{TR}{TC}$$

Explanation :

TR = *Total Revenue* / Total Revenue of Paddy Farming (Rp)

TC = *Total Cost* / *Cost of Irrigated Lowland Rice* (Rp)

Here's the English translation of your text in academic style:

From the formula above, the following criteria are obtained:

R/C > 1 means that paddy farming is efficient.
R/C = 1 means that paddy farming is at the break-even point.
R/C < 1 means that paddy farming is inefficient.

3. RESULTS AND DISCUSSION

Farm revenue from paddy cultivation is obtained by multiplying rice production by the selling price of rice. The production, price, and revenue of paddy farming are presented in Table 1.

Table 1. Average Production, Price, and Revenue of Irrigated Lowland Rice Farming in Juwiring District, First Planting Season (MT I) 2024

No	Description	Average Production, Price, and Revenue per Ha (Irrigated)
		Per Ha Irigasi
1.	Production (Kg)	4.281,47
2.	Price (Rp/Kg)	4.600,00
3.	Revenue (Rp)	19.694.784,4

Source: Primary Data Analysis

The average production of irrigated lowland rice farming in Juwiring District is 4,281.47 kg/ha. The selling price of harvested dry paddy received by farmers is IDR 4,600.00/kg. The average revenue of irrigated paddy farmers in Juwiring District is IDR 19,694,784/ha.

The average income of irrigated paddy farming can be calculated by subtracting the total cultivation cost incurred by farmers from the total revenue. Efficiency is obtained using the formula of total revenue divided by total cultivation cost. The results of these calculations are presented in Table 2 below.

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Table 2. Average Net Income and Efficiency of Irrigated Lowland Rice Farming in Juwiring District, First Planting Season (MT I) 2024

No	Description	Net Income per Ha (Irrigated)
1.1	Revenue	19.694.784,4
2.2	Cost	11.102.026,37
3.3	Income	8.394.892,75
4.4	Efficiency (R/C Ratio)	1,83

Source: Primary Data Analysis

The average income obtained from irrigated paddy farming in Juwiring District is IDR 8,394,892.75/ha. The farming cost incurred by irrigated paddy farmers amounts to IDR 11,102,026.37/ha. The revenue from irrigated paddy farming is IDR 19,694,784.4/ha. The farming efficiency of irrigated paddy in Juwiring District is 1.83. Based on the explanation above, it can be concluded that irrigated paddy farming in Juwiring District is feasible for farmers, as the R/C ratio is greater than 1, indicating that the farming system is efficient and economically viable. Good farming is farming that has high productivity and efficiency (Majka et al, 2011).

4. CONCLUSION

The average income obtained from irrigated paddy farming in Juwiring District is IDR 8,394,892.75/ha. The farming cost incurred by irrigated paddy farmers amounts to IDR 11,102,026.37/ha. The revenue from irrigated paddy farming is IDR 19,694,784.4/ha. The farming efficiency of irrigated paddy in Juwiring District is 1.83. Based on the explanation above, it can be concluded that irrigated paddy farming in Juwiring District is feasible for farmers, since the R/C ratio is greater than 1, indicating that the farming system is efficient and economically viable.

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