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Efficiency in the Use of Rice Farming Organic Inputs to Promote Food Security

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Abstract.
Rice farming is highly developed in Tabanan Regency, which accounts for 27.04% of the agricultural land in Bali's eight districts. Rice output is on the decline: 188,446 tons of rice were produced in Tabanan in 2018, 158,757 tons in 2019, and 142,846 tons in 2020. The use of inputs can influence farm productivity. Rice farmers have started to switch to using organic inputs such as fermented organic fertilizers through input processing technology innovations, and to using vegetable pesticides to combat disease. Land owned by farmers is classified as narrow land. Farmers' awareness of the importance of providing healthy food is a powerful motivator for using organic inputs in rice production. The focus of this research was to determine the efficiency of rice farming inputs to ensure food security. The research took place in Tabanan Regency, with five groups of farmers who use organic fertilizers to manage their farms. Data were analyzed using cost analysis to determine the amount of input used in farming, and acceptance analysis to determine the optimal amount of farm productivity and income. The farmers had low land, according to the findings. Farmers have not been able to use farm inputs according to the requirements of Indonesian national standards to create food security, so their use of inputs is inefficient. The results showed that farmers benefit from rice farming innovations.

Keywords: Organic farming, input rice organic

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1. Introduction

Agriculture is still a priority in national development because Indonesia is an agricultural country considering that most of the Indonesian people are farmers, both managing large and narrow lands. The agricultural sector can grow the national economy, data and statistics of the agricultural sector showed positive growth, reaching 2.59% with the subsector of food crops as the highest contributor, namely 10.47%. The figure is driven by an increase in the area of harvest and production of rice, corn, cassava, and relatively good weather support [1].

The agricultural sector contributed to the growth of 5 employment sectors. Then if we look at the trade of agricultural products abroad also experienced a 14% increase

with 3 main commodities, namely coffee, medicinal plants, and spices, Therefore the agricultural sector has a great opportunity to improve the National Economy.

Rice production in Bali Province according to the Central Statistics Agency of Bali Province (2021) showed that from 2018 to 2020, Tabanan regency is the district with the largest number of rice production in Bali. In 2018 amounted to 188,446 tons, in 2019 amounted to 158,757, and in 2020 amounted to 142,846 tons of dry milled grain. Total rice production in the province of Bali by Regency and City in 2018 to 2020

TABLE 1: Production and area of Rice Harvest in Bali.

Regency/ City	Harvested Area (ha)			Production (tons)		
	2018	2019	2020	2018	2019	2020
Jembrana	10.419	9.589	9.001	61.005	60.129	47.178
Tabanan	32.475	26.607	25.270	188.446	158.757	142.846
Badung	17.700	12.943	13.629	109.583	85.476	83.587
Gianyar	19.025	17.367	15.157	118.833	100.867	91.623
Klungkung	2.862	4.132	3.768	18.097	28.690	25.765
Bangli	3.358	2.588	2.737	13.946	13.401	13.626
Karangasem	8.113	6.846	6.979	49.905	40.625	41.010
Buleleng	13.430	12.798	11.289	82.272	73.121	62.836
Denpasar	3.596	2.449	3.152	24.980	18.255	23.697
Total :	**110.978**	**95.319**	**90.982**	**667 069**	**579 321**	**532 168**

Source : Processed by secondary data , 2020

Fluctuations in rice production in Bali are caused by various constraints both internally and externally. Internal problems faced are low ownership of farmers' land, degradation of Balinese farmers, limited farming inputs, and decreased farmer motivation. While external factors faced competition between businesses, shifting jobs from farmers to non-agriculture.

The integration system of livestock rice is one of the innovations in the development of agricultural and livestock businesses in an area launched in 2002 to increase integrated rice productivity in the rural sector. The integration system of livestock rice farming is an economic model to evaluate the economy of farmers' households. In this case, farmers play a role both as producers and consumers who allocate resources for agricultural production [2].

Another problem is the fluctuating grain prices, the high price of subsidized fertilizers, and dependence on middlemen in selling their crops, the quality of human resources causes still limited cause the household economy of farmers has not fully increased.

Rice farming production requires labor production factors, agricultural land, capital, seeds, fertilizers, and pesticides. Production factors that become agricultural inputs that

affect the potential to increase production to obtain optimal output as a solution for the government seek action in the production of farming [3] .

Optimal production is the allocation of rice farming production resources and the range of fluctuations in input and output prices in optimal farming conditions[10]. To increase food production and food safety, the government has established agricultural policies based on the use of organic inputs through the integrated system of livestock crops since 2009 to support agricultural productivity through cooperation between the Agricultural R&D Agency and the Governor of Bali. This program is motivated by the increasingly widespread transfer of agricultural land functions in Bali.

Selemadeg District is one of the areas included in the cultivation of rice farming using organic inputs, 60 farmers produce rice with the integration system of Balinese cattle rice. Rice farming is carried out to implement agricultural innovations to reduce the use of chemical inputs in rice farming.

The purpose of the research is to determine the productivity of rice farming in the East Selemadeg District in the use of organic inputs in rice farming and to determine the ratio of revenues and costs in rice farming.

2. Method

The research was carried out in the Selemadeg sub-district, the location was determined deliberately with the consideration that the Selemadeg sub-district is one of the areas included in the management of rice farming using organic inputs. farmers who produce rice with an integrated system of Balinese cattle rice. Rice farming is carried out in an effort to implement farming innovations to reduce the use of chemical inputs in rice farming. There are 60 farmers who are respondents

The analysis used is Income Analysis

Formula:

π = TR -TC

TR = P x Q

TC = FC + VC

Descrition :

π = Farm income

TR = Total Revenue

TC = Total Cost

FC = Fixed Cost

VC = Variabel Cost

Q = Product

P = Price

b. Feasibility analysis

Soekartawi (2002) states that to determine the feasibility of a business can be calculated using Revenue Cost Ratio (R/C-ratio) analysis. Revenue Cost Ratio otherwise known as the ratio (ratio) between Total Revenue (TR) and Total Cost (TC), which is formulated below :

R/C = TR/TC

Description :

TR = Total Revenue (Rp)

TC = Total Cost (Rp)

R/C = Comparison between total revenue and total cost

R/C = 1means that the farm does not make a profit and does not lose or break even,

R/C < 1, shows that the business is not worth the effort,

R/C >1, farming is worth working on

3. Result and Discussion

3.1. Integrated agricultural system technology in realizing food safety

Food availability is related to food supply through production, distribution, and exchange. Food production is determined by a variety of factors, including land ownership and use; land type and management; selection, breeding, and management of crops; breeding and management of farm animals; and harvesting.

Agricultural technology innovation will be more important because the government is determined to realize food that is safe to consume so that agricultural technology innovation plays a considerable role in improving rice productivity.

Agricultural crop production can be affected by changes in temperature and rainfall. Land, water, and energy utilization to grow foodstuffs often compete with other needs.

Efforts to overcome the food threat needed in the population, especially rice food needs become unbalanced with the availability of rice food produced throughout the year due to changes in various factors in a region [4].

Integrated rice farming technology is one of the technological innovations in the utilization of local resources in producing. Rice production and livestock production simultaneously owned by farmers are accompanied by the production of organic fertilizer from livestock waste, and animal feed from rice waste, as a production cycle with optimal utilization of waste.

3.2. Organic input as production innovation of crop and livestock integration

Farmers cultivate rice using agricultural inputs that minimize chemical fertilizers. Gradually and increase the use of organic inputs. The provision of organic material-based product inputs in the form of fertilizers or pesticides is an effort to improve the component results, quantity, and quality of safe and healthy results.

Rice nutrient content is influenced by the provision of organic-based product inputs and improving post-harvest quality in terms of yield value [5] .

Rice farming inputs include seedlings, fertilizers, medicines, and labor. Rice farming production by the *Upsus* program was influenced very significantly by the area of land, labor, seeds, fertilizer KCL and medicines. There are significant differences in the use of organic fertilizers and urea fertilizers, while SP36 fertilizers are not significantly different in increasing rice farming production [6].

Rice farming in East *Selemadeg* District requires agricultural input as follows organic fertilizer, urea urine fertilizer on an average land area of 1ha. The use of organic fertilizer for standard rice is 2 tons per ha, but in organic rice farming in *Selemadeg Timur* District farmers can use only 1.2 tons because fertilizer production is still limited from processed cattle waste which is owned by farmers on average 2 heads. So fertilizer production is still limited. Rice production requires urea fertilizer, SP36, and KCl average with a ratio of 200kg: 135 kg and 75 KG [7] .

TABLE 2: The use of rice farming inputs in east Selemadeg District.

Cost	Volume	Unit	Price
Organic Fertilizer	1.200	Kg	1.080.000
Urea Fertilizer	50	Kg	65.000.00
Urine	10	Ltr	50.000
Tractor	12	HOK	3.600.000
Workforce	70.000	Rp/Day	4.716.000
Agricultural Tools		Rp	155.555,56
Sum			9.666.556

Source : processed from primary data 2021

3.3. Rice farming productivity in East Selemadeg District

In line with rice research in *Kesesi* District, rice farming productivity is 4.7 tons/ha. Productivity is significantly influenced by land area, the number of seeds, and some which are not significantly influenced by cropping pattern systems, and the use of urea fertilizer in rice farming [8].

Rice farming in East *Selemadeg* District is only able to produce as much as 3 tons/ha, since using compost fertilizer, and reduce the dose of urea fertilizer gradually since 2014. Farmers use organic fertilizer gradually and the price received by farmers is Rp 6,000 so the revenue obtained by farmers reaches Rp 18,000,000 in one production (four months) on the land of 1 ha. Based on the farm productivity of 3 tons/ha of harvested dry grain, it is low productivity. That is also caused by the condition of the rice fields in this area in the form of terraces so that the rice fields consist of many paths with small expenses. As well as the occurrence of pest attacks that are not fully capable of overcoming farmers only by using organic inputs.

Increased productivity requires the support of technological innovations such as increased crop index, superior varieties, use of quality and labeled seeds, OPT control, nutrient management, planting population regulation, through the improvement of planting systems, and others [9].

3.4. Feasibility of rice farming using Organic inputs

Rice farming conducted by farmers in east *Selemadeg* District is on terraced land, this leads to lower production due to a large number of rice paths in the rice fields. The use of agricultural inputs has been done by farmers but fluctuations in production are also inevitable, this encourages the need to measure the feasibility of rice farming in East *Selemadeg* District.

Based on the results of the research showed R/C obtained in rice farming with technological innovations of the integration system of Cattle Crops Bali obtained greater than 1. The revenue amounted to Rp 18,000,000 and the cost of farming amounted to Rp 9,666,556 so that the R/C value of 2 was obtained. If all production factors are issued by one unit, then the production will increase by greater than one unit. The results of the R/C analysis reached 2 (*1), showing that rice farming is worth trying even though productivity is only 3 tons/ha. Such productivity has benefited farmers despite the low level.

Rice farming in *Pamona Puselemba* District with a planting area of 1 ha showed an R/C value of 2.62, this is due to efficient production costs causing a greater level of economic feasibility [10] .

4. Conclusion

The results showed that: the use of organic inputs rice farming in East Selemadeg District is highest in labor needs, the use of tractor services, and organic fertilizer. Rice farming with the use of organic inputs is worth developing because it provides an R/C ratio value of 2.

The impact of using organic-based inputs will initially provide a decrease in production in rice farming, but it can ensure the safety of agricultural workers due to the decrease in pesticide use and provide safe food for consumption.

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