

## **Rice farming and farmer income: a case study at Kota Utara Sub District, Gorontalo Province**

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### **Abstract**

This research purpose to analyze the effect of the input use in rice farming on the income of farmers and analyze the efficiency of input in the production of rice farming to know farmers income at Kota Utara Sub District. The data obtained and analyzed used Cobb-Douglas analysis production function and efficiency analysis using input (allocative efficiency). The results showed that the use of production inputs together affect to the rice farming of farmers income. The results of efficiency indicate that the use of each input such as land, labor, seeds, fertilizers Phonska, urea, spontaneous drugs, score score are inefficient in the use of production input. Therefore, it is necessary to be reduced to achieve efficient use of production inputs.

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*Keywords: Rice Farming, Production Input, Production Efficiency*

### **INTRODUCTION**

Indonesia is an agricultural country which agricultural development is a top priority, also Indonesia is one country that provides a high commitment to the development of food security as a strategic component based on national development Law Number 7 of 1996 on food stated that food security is the embodiment of government liabilities with the public. Development of the agricultural sector as the primary food sector in Indonesia is very important in the development of Indonesia. This is because more than 55% of Indonesia's population works and carries out its activities in agriculture and living in rural areas (Notarianto, 2011)

Food security always identified with rice or paddy commodity. Because this commodity is able to change the pattern of community standards in consuming food besides this commodity. Therefore, rice farming has become a national issue when international issues each nation to answer the need for basic food today.

So that need effort to improve food security in the future, both at the national and household level should be a major concern in agriculture development by prioritized the achievement of production to meet national needs as a strategic objective to avoid the influence of world food price instability (Diantoro et al., 2009). Observed the descriptions above can be said that the potential of food crops able to meet national needs if it can achieve the maximum yield. On the other hand can meet the needs of national food can also increase the income of farmers as farming act.

Gorontalo Province is one of area that produce food crops production rice in rice rfarming activities. Gorontalo city divided into nine sub district where one of them is Kota Utara Sub District. Kota Utara Sub District divided into six villages including West Wongkaditi and East Wongkaditi Village. It need to be developed by promoting the intensity of agriculture for food crops in order to increase production and farm income.

West Wongkaditi Village has a land area ± 143.19 hectares and used for farming is ± 63.18 ha of agricultural land and the region of East Wongkaditi Village has a land area ± 146.57 Ha, used ± 79.8 ha for farming. With the number of inhabitants in each region, Wongkaditi West Village population of 2,250 with a number of farmers in them as much as 32, then in the Wongkaditi East Village with a population of 3,614 and the number of farmers is 75, with total production on an annual basic in the Wongkaditi West Village of 6.03 tons/ ha and in the East Wongkaditi Village of 8

The importance of the rice crop is then carried out research activities on the efficient use of production inputs, and the effect on the income of farmers in Kota Utara Sub District, Gorontalo. The purpose of this study are: (1) to determine the influence of the use input production on rice farming to the farmers income in Kota Utara Sub District, Gorontalo, and (2) analyze the efficiency of the use input production on rice farming to the farmers income in Kota Utara Sub District, Gorontalo.

## METHODS

The research conducted at West Wongkaditi and East Wongkaditi Village, Kota Utara Sub District, Gorontalo. The population on this research is the farmers in West Wongkaditi and East Wongkaditi Village, Kota Utara Sub District, Gorontalo.

The number of population is 107. Sampling technical method use Slovin formula:

$$n = N/1+(N \times e^2)$$

Where:

- n = Sample Measure
- N = Population Measure
- e = Error Tolerance

Based on equation above found that sample determination has the number of error tolerance by 10 %, obtained a sample of 52 farmers.

This research used data collection method by:

### *Observation*

Done by watching to the research location at West Wongkaditi and East Wongkaditi Village, Kota Utara Sub District, Gorontalo.

### *Interview*

Technical of interview used to the institute as farmer groups which the interview contain about the use of input production efficiency of rice farming.

### *Questionnaire*

Used primary data collect by Questionnaire that made before the survey needs and based on the data.

Furthermore, data found analyze with:

### *Cobb-Douglass Production Function*

To know the affect of input use rice farming to farmers income describe by Cobb-Douglass function:

$$Y = a.X_1^{b_1}.X_2^{b_2}.X_3^{b_3}.X_4^{b_4}.X_5^{b_5}....X_n^{b_n}.e^u$$

Where:

- Y = Income
- X<sub>1</sub> = Land Area (Ha)
- X<sub>2</sub> = Labor
- X<sub>3</sub> = Seed

- X<sub>4</sub> = Phonska fertilizer
- X<sub>5</sub> = Urea fertilizer
- X<sub>6</sub> = Spontan Drug
- X<sub>7</sub> = Score Drug
- a,b = Coefficient
- u = Disturbance term
- e = Natural Logarithm, e = 2,718

**Efficiency analysis of input use (allocative efficiency)**

To know the use of input production count by input price ratio to the output (PX<sub>i</sub>/PY) with the physical marginal (PM), and the coefficient are (Anandra, 2009). To count the allocative efficiency of production function with:

$$NPMX = PX \text{ atau } NPMX / PX = 1$$

Where:

- PM : Marginal Production
- NPM : Production Marginal Value
- Pxi : Production Price

Criteria are:

- If NPM/Pxi > 1, has not efficient.
- If NPM/Pxi = 1, efficient.
- If NPM/Pxi < 1, not efficient

**RESULT AND DISCUSSION**

**Farmers characteristics**

Farmers characteristics consist of age, education, farming experience, and the number of dependents in the family.

**Age**

The age of farmers is one of factor that have influence to the farmers ability in order to doing activity of rice farming. Also the age of farmers as one of productivity determinant.

**Table 1.** Age characteristics farmers Sample in West Wongkaditi and East Wongkaditi Village, Kota Utara Sub District, Gorontalo 2016

Number	Age (Year)	Total Responden (Person)	Percentage (%)
1	0 - 15	0	0
2	16 - 60	38	73,08
3	> 60	14	26,92
Total		52	100

Source: Primary data, 2016

Based on the data in Table 1 above that there is no sample of farmers under the age of 15 years or the age of the so-called unproductive, and in the majority of samples of paddy farmers who became respondents are in the age range of 16-60 years with a number of 38 person or 73.08%. But at the age of 16 to 60 is a productive period in which farmers can work hard and easy does it accept existing agricultural technology innovation.

### ***Farmers education***

The capabilities of human resources have been located can be seen one of them at the level of education. The level of education is one important factor in supporting the ability of farmers in rice farming activities. At the level of education in question in this case is the level of formal education ever taken by the farmers in East Wongkaditi Village and West Wongkaditi Village, from the level of primary education to college. The education level of the sample farmers is also one of the variables.

**Table 2.** The education level farmers in West Wongkaditi and East Wongkaditi, Kota Utara Sub District, Gorontalo 2016

<b>Number</b>	<b>Education level</b>	<b>Total (Person)</b>	<b>Percentage (%)</b>
1.	Elementary	28	53,85
2.	Junior High School	9	17,30
3.	Senior High School	15	28,85
	Total	52	100,00

*Source: Primary data, 2016*

Based on Table 2 above explained that the majority of low land rice farmers are farmers sampled at large primary school with 28 person or 53.85% of the total number of samples of farmers. This is due to lack of awareness and education of farmers will prioritize work to benefit by managing their own land or arable land.

### ***Family dependents***

Family farmers are natives who have long been living and in general a farmer has to have a family who has been married and is the owner of land. Farmers samples generally possessed dependents but does not have the manpower to do the farming.

**Table 3.** The Numbers of family dependents sample of rice farming in West Wongkaditi and East Wongkaditi, Kota Utara Sub District, Gorontalo 2016

<b>Number</b>	<b>Family Dependents (Person)</b>	<b>Total (Person)</b>	<b>Percentage (%)</b>
1.	0-3	38	73,08
2.	4-6	14	26,92
	Total	52	100,00

*Source: Primary data, 2016*

The sample had a number of family burden is greatest 0-3 with the number of 38 person or 73.08% of the total number of samples and the number of dependents with a number 4-6 to number 14 person or 26.92% of the total amount existing samples.

### ***Farming experience***

Farming experience is an important factor in supporting farming activities, not only the level of education and other factors, but farming experience gained during farming is one important factor, the longer the farming is done, the more experience gained farmer farming samples.

**Table 4.** Farming experience sample in rice farming of West Wongkaditi and East Wongkaditi Village, Kota Utara Sub District, Gorontalo 2016

<b>Number</b>	<b>Farming Experience (Person)</b>	<b>Total (Person)</b>	<b>Percentage (%)</b>
1.	< 10	18	34,62
2.	11 – 20	8	15,38
3.	> 20	26	50,00
	Total	52	100,00

*Source: Primary Data, 2016*

Farmers with long experience of farming for more than 20 years or 50% is the highest. This is caused by farmers who prefer to farm at a young age with education level lower to gain experience of farming or based on their farming experience.

**The input influence of production**

The Influence of rice farming production input in East Wongkaditi Village and West Wongkaditi Village can be calculated using the analysis income function Coubb Douglas. By looking at the significant value of the F-count to know how much influence the inputs or factors of production given to farmers income.

Table 5. The elasticity value and the influence of input use production to rice farming in West Wongkaditi and East Wongkaditi, Kota Utara Sub District, Gorontalo 2016

Category	F-Count	Sig.	Elasticity Value
<b>Inputs Production</b>	1,668	0,000	<b>Value</b>
<b>Input Factors</b>	t.count	Sig	<b>(bi)</b>
1. LL (X <sub>1</sub> )	3.160	0.003	0.106
2. TK (X <sub>2</sub> )	-10.336	0.000	-0.154
3. Bibit (X <sub>3</sub> )	-1.498	0.141	-0.138
4. Phonska (X <sub>4</sub> )	3.013	0.004	0.063
5. Urea (X <sub>5</sub> )	2.477	0.017	0.020
6. Spontan (X <sub>6</sub> )	0.971	0.337	0.081
7. Score (X <sub>7</sub> )	8.988	0.000	1.045
<b>Jumlah</b>			
Coefficient Corelation (R) = 1			
Coefficient Determination(R <sup>2</sup> ) = 1			
A Value =18.465			

Source: Primary Data, 2016

The significant results of F test explains that the use of production inputs jointly affect the income of farmers of paddy which is the significant value of 0.000. This means that the use of input rice production have an impact on income. The value of elasticity (bi) land area (X<sub>1</sub>) = 0.106, labor (X<sub>2</sub>) = -0.154 seeds (X<sub>3</sub>) = -0.138, fertilizer Phonska (X<sub>4</sub>) = 0.063, urea (X<sub>5</sub>) = 0.020, spontan drug (X<sub>6</sub>) = 0.081, score drug (X<sub>7</sub>) = 1,045

Equation Coubb-Douglas revenue function as follows:

$$Y = 18,465.X_1^{0,106}.X_2^{-0,154}.X_3^{-0,138}X_4^{0,063}.X_5^{0,020}.X_6^{0,081}.X_7^{1,045}$$

From the Table above, it can be obtained the coefficient of determination (R<sup>2</sup>) = 1, which means determination coefficient of 100%. This means that rice farming income (Y) of 100% is together influenced by land use, labor, seed, fertilizer Phonska, urea, drug spontanand score.

The relationship between income and production inputs can be detected through the correlation coefficient (R) which is equal to 1, which means a very strong positive relationship. Then subsequently influence their respective inputs on the income can be determined by using the t test. The influence of the use of each of the inputs are as follows:

**Land area**

Results significant t-test showed that the use of land area (X<sub>1</sub>) was highly significant, because sig less than 0.05. Great elasticity (b<sub>1</sub>) shows that each additional 1 acre land rice plant will provide additional revenue to Rp. 0.106. With an average use of

land covering an area of 80.2 acres will provide very real effect on the income of farmers and can provide additional income to farmers.

### ***Labor***

Results significant t-test showed that the use of labor ( $X_2$ ) was highly significant, because sig less than 0.05. Great elasticity ( $b_2$ ) shows that each additional 1 HKSP will give you a reduction on income. T value of labor is -10 336 then this is the influence of the inverse relationship where every additional 1 HKSP will only provide a reduction to income. T value of labor is -10 336 then this is the influence of the inverse relationship where every additional 1 HKSP will only provide a reduction to income. If the value of X is higher then the Y value will be reduced. Therefore the use of labor should be reduced.

### ***Seed***

Results significant t-test showed that the use of seeds ( $X_3$ ) is not significant affect, because sig higher than 0.05. However great elasticity ( $b_3$ ) shows that each additional 1 kg of seeds will give you a reduction on income. T value of seed is -1498, then it is the influence of the inverse relationship in which each additional 1 kg of seed will only give a reduction to income. T value of seed is -1498, then it is the influence of the inverse relationship in which each additional 1 kg of seed will only give a reduction to income. If the value of X is higher then the Y value will be reduced.

### ***Phonska fertilizer***

T-test results indicate that the use of fertilizers Phonska ( $X_4$ ) was highly significant, because sig less than 0.05. Great elasticity ( $b_4$ ) showed that the addition of every 1 kg of fertilizer Phonska will provide additional revenue to Rp 0.063. With an average use of fertilizer Phonska as much as 214.2 kg will provide significant effect on the incomes of farmers and will provide additional income to farmers.

### ***Urea fertilizer***

T-test results indicate that the use of urea ( $X_5$ ) was highly significant, because sig <0.05. Great elasticity ( $b_5$ ) shows that each additional 1 kg of urea fertilizer will provide additional revenue to Rp 0,020. With an average use of urea fertilizer 196.2 kg will provide a real impact on farmers income and can provide additional income to farmers.

### ***Spontan drug***

Significant T-test results showed that spontaneous drug use ( $X_6$ ) effect is not significant, because sig higher than 0.05. Great elasticity ( $b_6$ ) shows that each additional 1 ml of the drug will spontaneously provide additional revenue to Rp 0.081. With an average use of 0.8 liter of spontaneous drug will effect not significant on the income of farmers but can increase farmers' income.

### ***Score drug***

Significant T-test results showed that the use of medication score ( $X_7$ ) was highly significant, because sig less than 0.05. Great elasticity ( $b_7$ ) shows that each additional 1 ml of the drug to the score will provide additional revenue to Rp 1,045. With an average use of drug score as much as 0.2 liters will give you a real impact on the income and can provide additions to the income of farmers.

### **Use input production efficiency**

The efficiency of input use is to see if the physical production marginally smaller, larger, or equal to the price ratio of input to output. From there it can be concluded whether land, seed, fertilizer, and the drug should be reduced or increased.

Table 6. The efficiency of Input Production Use in Rice Farming West Wongkaditi and East Wongkaditi, Kota Utara Sub District, Gorontalo 2016

Production Factor	Input Average	(bi)	Input Price (Pxi)	PMxi	NPM xi	NPMxi/Pxi
Land Area (X <sub>1</sub> )	80,2	0.106	400.961	0,0058	58	0,000
Labor (X <sub>2</sub> )	83,6	-0.154	50.000	-0,0027	-27	-0,000
Seed (X <sub>3</sub> )	20	-0.138	7.500	-0,0132	-132	-0,018
Phonska (X <sub>4</sub> )	214,2	0.063	2.300	0,0011	11	0,005
Urea (X <sub>5</sub> )	196,2	0.020	1.800	0,0003	3	0,002
Spontan (X <sub>6</sub> )	0,8	0.081	85.000	0,2893	2.893	0,034
Score (X <sub>7</sub> )	0,2	1.045	155.000	2,8283	28.283	0,182
Income (Y)	15.866.055					
Production Price (Py)	10.000					

Source: Primary data, 2016

The results of the calculation of the ratio of NPMxi and PMxi on each production inputs there is no equal to one, indicates that the use of production inputs has not reach efficiency. Here can be seen the efficiency of the use of each of the inputs:

**Land**

The average use of land in low land rice farming in West Wongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalo is a 80.2 acre / sample in order to obtain the efficiency of 0.000. The efficiency value less than one means inefficient use of production inputs that need to be reduced. To achieve efficient paddy rice farmers must reduce the use of land area. By reducing the area of land it can also reduce the costs resulting from the large area of land so that land use can be efficient.

**Labor**

The average amount of labor inrice farming in WestWongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalawas 83.6 HKSP/sample in order to obtain the efficiency -0.000. The efficiency value indicates less than one. This shows that the efficient use of production inputs so that the user does not need to be reduced. To achieve efficient, farmers must reduce the use of labor. With the use of labor per area of 100 Are (1 ha) using a workforce of 15 person, the use of labor should be reduced in order to use labor efficiently.

**Seed**

The average use of seeds rice farming in SWestWongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalo is 20 kg / sample in order to obtain the efficiency of -0.018. The efficiency value which indicates less than one means of production inputs are used efficiently so that the user need not be reduced. To achieve the efficiency, farmers should reduce the use of seeds. With the use of the land area of 100 seeds in Are (1 Ha) using 25 kg of seed, then use the seeds need to be reduced in order to use the seeds to be efficient.

**Phonska fertilizer**

The average use of Phonska fertilizer on rice farming in WestWongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalo is 214.2 kg / acre in order to obtain the efficiency of 0.005. The efficiency value indicates that the use of production inputs is less than one, meaning that production inputs used has not been efficient so as to achieve the efficiency, farmers should reduce the use of fertilizers Phonska. With the use of fertilizer on the land area of 100 Phonska Are (1 ha) of 300 kg, the use of

fertilizers Phonska need to be reduced in order to become efficient fertilizer use Phonska.

### ***Urea***

The average use of urea rice farming at WestWongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalo 196.2 kg / acre in order to obtain the efficiency of 0.002. The efficiency value indicates that the use of production inputs is less than one, meaning that production inputs are used efficiently so that the user need not be reduced. With the use of urea fertilizer on the land area of 100 Are (1 Ha) 200 Kg, then the use of urea fertilizer should be reduced so that the use of urea to be efficient.

### ***Spontan drug***

The average number of spontandrug on rice farming in WestWongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalo 0.8 ml / sample in order to obtain the efficiency of 0.034. The efficiency value indicates use of production inputs is less than one, meaning that the use of production inputs has not been so efficient that use of production inputs to be reduced. To achieve the efficiency of farmers must reduce drug use spontaneously. With the use of drugs on the land area of 100 spontaneous Are (1 ha) 1000 ml (1 liter) should be reduced in order to be efficient spontaneous drug use.

### ***Score drug***

The average score on the amount of drug use in rice farming WestWongkaditi, East Wongkaditi, and Kota Utara Sub District, Gorontalo 0.2 ml / sample in order to obtain an efficient value 0.182. The efficiency value indicates use of production inputs is less than one, meaning that the use of production inputs has not been so efficient that use of production inputs to be reduced. To achieve the efficiency of farmers must reduce drug use score. With drug use scores on the land area of 100 Are (1 ha) of 250 ml must be reduced in order to become efficient drug use score.

Based on the analysis of research hypothesis can be divided as follows:

1. The use of production inputs simultaneously (together) affect the income of farmers. While partially (respectively) of land, labor, Phonska fertilizer, urea, and medication scores significantly affect the income of paddy farmers. By looking at table 7 then sig of land, labor, Phonska fertilizer, urea, and score each drug was (0.003, 0.000, 0.004, 0.017 and 0.000), which means the value of the input sig production is less than 0.05 means the use of production inputs very significant effect on the income of farmers. While seedlings and spontaneous drugs worth 0.141 and 0.337 which means sig above 0.05 means the use of production inputs or no real effect on lowland rice farming income. Thus the first hypothesis is proven.
2. The use of production inputs in farming rice on Wongkaditi Village of East and West Wongkaditi overall inefficient. Based on the results of Table 8 can be seen NPMxi / PXI land area (0,000) employment (-0.000) seedlings (-0.018) fertilizer Phonska (0,005) urea (0.002) spontandrug (0.034) and a drug score (0.182) is smaller than 1 means the use of inefficient, thus the second hypothesis is not proven. By looking at the use of inputs farmers in the study site is its use in large numbers based on survey results, interviews and questionnaires and the results of the analysis showed that the use of inputs inefficient use of production inputs need to be reduced.

## **CONCLUSION**

Based on the analysis that has been done, it can be concluded some of the research conducted, it is as follows:



1. The use of production inputs (land, labor, seed, fertilizer Phonska, urea, spontan drug, score drug) when used simultaneously or toether affect the income of farmers. While partially or individual use of land, labor, Phonska fertilizer, urea, and medication scores very significant effect on the income of farmers of paddy, whereas the use of seeds and spontaneous drug did not significantly affect farmers' income.
2. The use of production inputs in rice farming rice fields in West Wongkaditi and East Wongkaditi, Kota Utara Sub District, Gorontalo inefficient in the use of land, labor, seed, fertilizer Phonska, urea, spontaneous drugs and drug score.

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