



(RESEARCH ARTICLE)



Analysis of factors influencing production of rice farming and farmers preferences in addressing production risks in Tanjung Jabung Barat district, Jambi province

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World Journal of Advanced Research and Reviews, 2023, 20(02), 649–655

Publication history: Received on 29 September 2023; revised on 07 November 2023; accepted on 10 November 2022

Article DOI: <https://doi.org/10.30574/wjarr.2023.20.2.2055>

Abstract

Study This aim For analyze influencing factors production farming lowland rice and preferences farmer respond production farming paddy fields in Tanjung Jabung Barat Regency, Jambi Province. Locus study are Sriagung Village and Rawa Medang Village taken in a way *purposive*. Size sample as many as 91 respondents. Withdrawal method sample use simple random sampling method. Estimation function production use function production *Cobb- Douglass*. Approach method preference farmer respond risk production use method *Moscardi and de Janvry*. Determinant factors function production farming paddy fields are Urea Fertilizer, NPK Fertilizer, Fertilizer organic and pesticides. Variable Urea fertilizer, NPK fertilizer and fertilizer organic very significant effect to production. Preference farmer respond risk production based on third variable the obtained that farmer own preference avoid risk.

Keywords: Input; Production; Risk; Preferences farmer

1. Introduction

One commodity continued agriculture developed For resilience food is rice. Rice is commodity agriculture has an important meaning for residents, esp commodity rice. Commodity rice have function main as supplier food national. Remember commodity very supportive rice to resilience food national so development commodity that is very important. Need material food rice No Once ebb, rather always increase in accordance with growth resident as the most determining factor big request rice. Can't denied that rice occupy very strategic position for life society, one side rice is commodity the economy is becoming source income farmers, as well fulfillment need for public others.

Tanjung Jabung Barat Regency is one of them areas that have potency bigr in development agriculture in commodity rice. Tanjung Jabung Barat Regency is also center production rice fields in Jambi Province. However, production rice fields in Tanjung Jabung Barat Regency each the year experience fluctuation. In 2019 production lowland rice was 4.44 tonnes/ha then experience decrease in 2020, namely amounting to 4,157 tons/ha then experience increase Back in 2021 ie amounting to 4,502. Fluctuations that occur every the year caused by use factors production yet efficient. Farming Paddy rice in Tanjung Jabung Barat Regency is cultivated in several areas sub-district, one among them is Subdistrict Batang Asam. Subdistrict Batang Asam is one of them producer paddy biggest third after Subdistrict Senyerang and District Batang Asam. However, level the production highest compared to subdistrict others.

Subdistrict Batang Asam is one of them producer paddy biggest third after Subdistrict Senyerag and District Pengabuan If seen from facet wide harvest and production. Agricultural land in the District Batang Asam 58.54% consists from almost rice fields all over land flowed with irrigation irrigation technical and the rest non-rice fields, as well majority its inhabitants profession as farmer paddy fields. Subdistrict Batang Asam inside there are Sri Agung Village and Rawa

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Medang Village is area agriculture paddy fields with type irrigation irrigation the widest technical area in the District Batang Asam. Farmers in second village the part big endeavor paddy rice as commodity agriculture main. Cultivated rice fields farmers in Sri Agung Village and Rawa Medang Village is type rice fields of Inpara 32, Sijunjung, and Melati. As for the average production amounting to 4-6.5 tonnes/ha. With price selling GKP at 4,000/kg.

Production input management must consider principle optimization to use achievement high production with efficient and effective input allocation. Use factor production in farming paddy naturally will influence amount output which will produced. If input smallest produce output biggest, so agriculture said efficient. However, production fluctuating rice prove that part big farmer not yet optimal provision of production input. There are risks production influence farmer take something decision in allocation of production inputs. The allocation of production inputs is very influential in tall low production rice.

Based on the above problems, research this aim to

- Describe farming paddy fields in the District Batang Asam
- Analyze influencing factors risk production farming paddy fields in the District Batang Asam and
- Analyze preference farmer respond risk production farming paddy fields in the District Batang Asam.

2. Material and method

This Study implemented in Tanjung Jabung Barat Regency. From several sub-districts in Tanjung Jabung Barat Regency were selected Subdistrict Batang Asam. Location of place study chosen with consider that Subdistrict Batang Asam is one of them mainstay from Tanjung Jabung Barat Regency as producer rice, so subdistrict This get more attention from government. From the District Batang Asam was selected in Sri Agung Village and Rawa Medang Village with consideration that second village This own wide irrigated rice fields with irrigation technical and partial big its inhabitants Work as farmer paddy fields. Object in study this is farmer paddy fields that have farming paddy fields. Amount population in study This that is as many as 1007 farmers, then done withdrawal sample with use Slovin method so obtained by 91 farmers sample, meanwhile taking sample done with *Simple Random Sampling Method*.

Collected data in study This are primary data and secondary data. Primary data was obtained from interview direct to farming farmers plant paddy fields in Sri Agung Village and Rawa Medang Village with use questionnaire, while secondary data obtained from agency or service related such as the Department of Agriculture Food Crops, Research and Development Center Plant Agriculture and Central Statistics Agency as well as literature and results related research with study this. The data required in study This namely :

- Identity farmers which include name, age, education level, number member family and experience farming.
- Land area (ha)
- Number production lowland rice (kg/ha/MT).
- Amount use power work (HOK),
- Seeds (kg/ha/MT)
- Fertilizer (kg /ha/MT)
- Medicines (ml/ha/MT).
- Relevant data anything else needed for research data.

The analytical method used for know influence factor production to results production paddy fields, namely analysis function Cobb Douglass Frontier production. Data and information obtained from farmer furthermore will analyzed and regressed. know how much big variable independent in matter This seeds, fertilizers, medicines, energy working and spacious land influence results production plant paddy as variable dependent. Written with equality as follows : $Y_0 = \beta_0 X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} e^u$

$$Y = \beta_0 X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} e^u$$

Function production the changed become form multiple linear functions with method transform equality the to in natural logarithm (ln). Form equality function production become :

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 e^u$$

Where :

Y = Amount Rice production (kg)

β_0 = Constant

X1 = Amount Seeds (kg/ha)

X2 = Urea Fertilizer (kg/ha)

X3 = NPK Fertilizer (kg/ha)

X4 = Fertilizer Organic (kg/ha)

X5 = Pesticide (ml/ha)

X6 = Labor (HOK)

b1-b8 = coefficient regression variables X1-X8

u = error

e = natural logarithm, e = 2.718

For know big proportion or percentage donation variation in total profits farming explained by each variable in a way together, used size coefficient determination (R^2) that can be measured with formula as following :

$$R^2 = \frac{b_i \sum x_i y_i}{\sum y_i^2}$$

Where:

R^2 = coefficient determination

b_i = coefficient regression variable i

x_i = value deviation something variable i from the average value ($x_i - \bar{x}$)

y_i = value deviation something variable i from the average value ($y_i - \bar{y}$)

After R^2 is obtained, then calculated F test value. The F test statistic is basically show is all variable independence is included in the model has influence in a way together to variable dependent. Method taking decisions used are:

- $H_0 : X_1 = X_2 = X_3 = X_4 = X_5 = X_6 = 0$, that is in a way together variable independent influential real to variable dependent.
- $H_1 : X_1 \neq X_2 \neq X_3 \neq X_4 \neq X_5 \neq X_6$ in a way together variable independent No influential real to variable dependent.

Criteria decision as following:

- If value probability (F- statistic) $< \alpha$ (0.05), then H_0 is accepted
- If value probability (F- statistics) $> \alpha$ (0.05) then H_0 is rejected.

After risk production analyzed so calculation preference farmer can done analysis use method *Mocardi and de Janvry*. As for form functional:

$$K_{(s)} = \frac{1}{\theta} \left(1 - \frac{P_i X_i}{P_y f_i \mu_y} \right)$$

Where:

θ = variation symbol from production ($\theta = V_a / E_a$) where V_a = deviation standard production farming and E_a = average farming production paddy

P_y = price product paddy fields

f_i = elasticity production from the i - th input (elasticity from the most significant and important inputs contribution biggest)

X_i = number of inputs i (number of inputs that are most significant and have contribution largest for each respondent)

P_{x_i} = price of input to - I (for each respondent)

μ_y = average production

$K_{(s)}$ = measurement of the reluctance parameter to risk.

3. Results and discussion

3.1. Characteristics Respondent

Becoming a farmer respondents in study This is farmer paddy fields. Farmer respondents in the area the average age of the study was 40-46 years with level Elementary school/ equivalent education and experience farming for an average of 15-19 years. as well as amount dependents family the average farmer is 4-5 people, while the average use factor production in the region study can seen Table 1.

Table 1 Average Use of Production Factors in the Research Area Year 2023

Variable Farming	Average (ha/MT)
Land (ha)	1.43
Seeds (kg)	27.03
Fertilizer (kg)	107.5
Fertilizer (kg)	187.5
Fertilizer KCl (kg)	18.13
Fertilizer Organic (kg)	347.8
Pesticide (ml)	3886.8
Labor (HOK)	87.75
Production	7.18

Source : Primary data processing , 2023

3.2. Estimation Results Function Production Rice Farming

Analysis function production aim For know How influence use of input to output, how response production (output) against use factor production (input). Estimation results function production can seen Table 2

Table 2 Estimation Results Function Production Rice Farming in the Research Area Year 2023

Variables	Coefficient	Std. Error	t-Statistics	Prob.
LN_X1	0.038766	0.049107	0.789413	0.4321
LN_X2	0.091413	0.021151	4.321972	0.0000
LN_X3	0.109095	0.024954	4.371754	0.0000
LN_X4	0.056164	0.008993	6.245648	0.0000
LN_X5	0.101639	0.029801	3.410571	0.0010
LN_X6	0.173475	0.099785	1.738487	0.0858
C	1.387525	0.501502	-2.766740	0.0070
R-squared	0.891064	Mean dependent var		1.571173
Adjusted R-squared	0.883283	SD dependent var		0.164600
SE of regression	0.056234	Akaike info criterion		-2.844787
Sum squared resid	0.265630	Schwarz criterion		-2.651644
Log likelihood	136.4378	Hannan-Quinn criter .		-2.766866
F-statistic	114.5155	Durbin-Watson stat		1.990892
Prob(F-statistic)	0.000000			

Adjusted R-squared value = 0.891, p This means 89.1 percent variation dependent (output) capable explained in a way simultaneous by variables independent (seed, urea fertilizer, NPK, fertilizer organic, pesticides and energy work) while the remaining 10.9 percent influenced by other factors outside the model. factors production (input) which has a very real influence to production (output) is urea fertilizer, NPK fertilizer, fertilizer organic, pesticides and energy work. As for factors production that is not influential real to production is seeds and energy work. Influence use factors production together to production paddy rice produced can is known with perform the F test, of results analysis obtained F- statistics as big as 114.5155 with mark probability 0.000000. Probability value more small of α (0.05) indicates influential results real, meaning variable free available in the model together influential to production paddy fields. The addition of b_1 to b_8 shows that $\sum \beta_i = 0.56 < 1$ p This means matter This means use factor production in the region study is in stage II which means every addition input proportion will produce increasing production output decreasing, in other words scaling farming paddy fields are *decreasing Return To Scale*.

Variable seed (X1) has coefficient regression of 0.03. This thing means big elasticity production is of 0.03. In other words if happen increase use seeds 10% then will production also increases lowland rice as much as 0.3%. The test results are significant show that mark $0.43 > \alpha$ (0.05) means that the seeds have no real effect. This means that there is no real influence on the use of seeds on increasing production farming Paddy fields are increasingly growing Lots seed used so No will influence enhancer production paddy fields. Research results This No in line with study Vebriyola (2018) stated that use seed influential real to production farming paddy fields. Variable urea fertilizer (X2) has coefficient regression of 0.09. This thing means big elasticity production use fertilizer organic to production is of 0.09. In other words if happen increase use fertilizer organic as much as 10% then will production also increased by 0.9% paddy fields in the area research . The test results are significant show that mark $0.000 < \alpha$ (0.05) means it has a real effect. This shows that there is a real influence in the use of urea fertilizer on production farming paddy fields. Research results This No in line with study Alfhadoly Wafi (2018) stated that use urea fertilizer has an effect real to production paddy fields.

Variable (X3) has coefficient regression of 0.10. This thing means big elasticity production use NPK fertilizer against production is of 0.10. In other words if happen increase use NPK fertilizer as much as 10% then will production also increases lowland rice as much as 1.0%. Test results are significant show that mark $0.0000 < \alpha$ (0.05) means that the effect is very significant. This shows that there is a real influence in the use of NPK fertilizer on increasing production farming paddy fields. Research results This in line with study Vebriyola Lubis (2018) stated use NPK fertilizer has an effect real to enhancement production farming paddy fields. Variable fertilizer organic (X4) has coefficient regression of 0.056. This thing means big elasticity production use fertilizer organic to production is of 0.056. In other words if happen increase use fertilizer organic as much as 10% then will production also increases lowland rice as much as 0.56%. The test results are significant show that mark $0.0000 < \alpha$ (0.05) means influential real. This thing show that there is influence real in use fertilizer organic to enhancement production good at rice fields. Research results This in line with Muhammad Tachya's research (2020) states that use fertilizer organic influential real to enhancement production farming paddy fields.

Variable Pesticide (X5) has coefficient regression of 0.10. This thing means big elasticity production use pesticide to production is of 0.10. In other words if happen increase use pesticide as much as 10% then will also increased by 1.0 %. The test results are significant show that mark $0.0010 > \alpha$ (0.05) means not significant. This shows that there is a very real influence in use pesticide to enhancement production farming paddy fields. Research results This in line with Saidin Nainggolan's research (2021) states that use pesticide influential real to production farming paddy fields. Variable Labor (X6) has coefficient regression of 0.173. This thing means big elasticity production use power Work to production is of 0.173. In other words if happen increase use power Work as much as 10% then will production also increases lowland rice as much as 1.73%. The test results are significant show that mark $0.085 > \alpha$ (0.05) means not significant. This shows that there is no real influence on the use of labor on enhancement production farming paddy fields. Research results This in line with Saidin Nainggolan's research (2021) states that use power Work No influential real to production farming paddy fields.

3.3. Preference Farmer Responding Risk Production

Urea Fertilizer, Fertilizer NPK and Fertilizer Organic own probability 0.000 or very influential real in production paddy fields. Because the, variable Urea Fertilizer, Fertilizer NPK and Fertilizer Organic used as a determining parameter category preference farmer respond risk farming paddy fields. Preference farmer respond risk in the area study can seen Table 3.

Table 3 shows that part big farmers (84.6%) are avoid risk if happen increase price urea fertilizer. Request for urea fertilizer input or use urea fertilizer will reduced if price urea fertilizer increased. Behavior farmers on use NPK fertilizers also avoid risk (risk averse) is 97.8% of farmers, meaning if happen increase price NPK fertilizer then will

happen down request NPK fertilizer or farmer will reduce use NPK fertilizer in farming. Likewise usage fertilizer Organic behavior Farmers are too avoid risk (risk averse) exists as many as 92.11% of farmers matter This means if happen increase price fertilizer Organic so will result amount fertilizer input demand Organic or farmer will reduce amount fertilizer Organic in farming rice.

Farmers who are risk neutral use variable Urea Fertilizer, NPK and Organic Fertilizer as a determining parameter behavior of 13.2%, 2.2% and 4.4% of farmers respectively. This thing means farmer neutral in take chance although the results obtained increase as well down. Increased production as well down No influence desire farmer in operate activity production, if happen increase and decrease production input prices so demand and use of production inputs farmer will still behave neutral. Farmers who have risk taker behavior towards Variable Urea fertilizer, NPK fertilizer and organic fertilizer are 2.2%, 0% and 3.3% of farmers respectively. Behavior farmer will still use or even add request to variable Urea Fertilizer, NPK Fertilizer and fertilizer Organic, though third variable price increases.

Table 3 Behavior Farmer Responding Risk Production in the Research Area in 2023

Urea Variable		
Criteria Behavior Farmer	Frequency (Farmers)	Percentage (%)
<i>Risk Taker</i>	2	2.2
<i>Risk Neutral</i>	12	13.2
<i>Risk Averse</i>	67	84.6
Total	91	100
Variable NPK Fertilizer		
Criteria Behavior Farmer	Frequency (Farmers)	Percentage (%)
<i>Risk Taker</i>	0	0
<i>Risk Neutral</i>	2	2.2
<i>Risk Averse</i>	89	97.8
Total	91	100
Variable Fertilizer Organic		
Criteria Behavior Farmer	Frequency (Farmers)	Percentage (%)
<i>Risk Taker</i>	3	3.3
<i>Risk Neutral</i>	4	4.4
<i>Risk Averse</i>	84	92.3
Total	91	100

Source : Primary data processing , 2023

4. Conclusion

Technology farming lowland rice is classified as conventional, no apply technology in accordance recommendation. Use of production inputs No in accordance recommendation Good allocation type Fertilizer, amount and timing giving Fertilizer No in accordance with recommendation. Determinant factors to production farming paddy sawh is Urea Fertilizer, NPK Fertilizer, Organic Fertilizer and Pesticides. Preference farmers are also determined by urea fertilizer, NPK fertilizer, and fertilizer organic. So by urea fertilizer, NPK fertilizer, and fertilizer organic used as variable For calculation preference farmer respond risk with method *Moscardi and de Janvry*. Preference farmer respond risk production farming part big is *risk averse* ($1.2 < K_{(s)} < 2.0$). This thing seen from farmer in use of production inputs that are not in accordance with recommendation usage so that production paddy rice produced not optimal. Apart from that, the price of GKP (grain dry rice) which is low influence farmer in use of production inputs.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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