Journal homepage: https://pcijournal.org/index.php/jmscowa

Journal of Mathematics and Scientific Computing with Applications

Published: Pena Cendekia Insani

ANALYSIS OF FACTORS AFFECTING PRODUCTION RICE IN LANGKAT REGENCY WITH METHODS BACKWARD IN MULTIPLE LINEAR REGRESSION YEAR 2018

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Article Info

Article history:

Received October 1, 2019
Revised November 2, 2019
Accepted December 2, 2019

Keywords:

lowland rice production, method backward

ABSTRACT

Rice is a food crop that is needed by the people of Indonesia, because the rice plant as a producer of rice that can be processed as a staple food for the population in Indonesia. Factors considered to have an effect on lowland rice production in Langkat Regency are: yearend crop residues, land area, rainy day rainfall, seeds, and fertilizers. In determining the factors that greatly influence the production of lowland rice, it is necessary to use multiple linear regression equations such as using the method backwards. That is, where all X variables are regressed with Y variables.

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1. INTRODUCTION

Rice is a food crop as a staple food for Indonesia, the need for rice will always increase with the increase in the population of Indonesia, with the increase in Indonesia's population, the supply of raw materials must also be increased, especially rice as a staple in Indonesia. (May, 2015)

In order to produce a high enough production, it is necessary to do research on the factors that affect rice production such as rainfall, rainy days, seeds, land area, fertilizer, final crop residue.

In multiple linear regression discusses the relationship pattern of several variables in the model, how the direct influence of the independent variable (independent) on the dependent variable. In this study, it is analyzed how big the influence of land area, rainfall (mm), seedlings, rainy days, fertilizer use (kg), and year-end crop residues.

2. RESEARCH METHODE

2.1 Regression analysis

Regression analysis is a statistical analysis tool that utilizes the relationship between two or more variables. The goal is to make a reliable estimate (prediction) to make called the dependent variable or dependent variable or (response), if the value of

another variable whose relationship is known (commonly called the independent variable or independent variable or predictor).

2.2 Multiple linear regression

Multiple linear regression is a linear regression consisting of one variable bound () (dependent) and more than one independent variable X 1, X 2 ,..., X k(independent). Meaning of linear is linear in its parameters and variables, which means that each parameter is only to the power of one and is not multiplied or divided by other parameters. The form of the multiple linear regression equation is as follows: (Gujarati, 2004).

Y i = 0 + 1 Xi 1+ 2 Xi 2 +...+ k X ic + i ; i = 1, 2,..., n

2.3 Linear Regression Model in Matrix

There are several models of linear regression equations in the matrix. (Kuniawan, 2016)
(2.1)
Y 1 = 0 + 1 X 11+ 2 X 21+.....+ p X p 1+ 1 Y 2 = 0 + 2 X 12+ 2 X 22+ ..... + p X p 2+ 2
Y 3 = 0 + 3 X 13+ 3 X 23+.....+ p X p 3+ 3
Linear regression model with dependent variables Y and p independent variable X 1 , X 2 ,..... X p , can generally be written as follows:
Y n = 0 + 1 X 1 n + 2 X 2 n + ... + p X pn + n

2.4 Method Backward This method is the opposite of the advanced

This method is the opposite of the advanced selection method. First of all, all independent variables are included in the model. Suppose there are 4 independent variables (X 1 , X 2 , X 3 , X 4), then the initial model can be
written: Y = 0 + 1 X 1+ 2 X 2+ 3 X 3+ 4 X 4

2.5 Parameter Estimation of Multiple Linear Regression Model

If you have a random sample of size n, that is (Y i , X 1 i , X 21 ,..... X pi) where i = 1,2,..., n from a population, then the regression model can be written: (Ria, 2013)
Y i = 0 + 1 X 1 i + 2 X 2 i + ... + p X pi + Ui

U i = Y i (0 + 1 X 1 i + 2 X 2 i + ... + p X pi

2.6 Determination Correlation Coefficient (Determination Index)

The correlation coefficient of determination (Determination index) is expressed by R 2 . This coefficient states the large proportion/contribution of X 1 , X 2 , X 3,... X k together against variation or fluctuation of Y. Price R 2 obtained by the following formula (Ria, 2013)

R 2 = JKR/JKT with 0 R 2 1

2.7 Research procedure

The research procedures applied in this study in order to achieve the research objectives are as follows:

a) Swallowing references that support research
b) take data to the Langkat district office
c) estimate multiple linear regression coefficients using the OLS . method
d) Choosing the best model with the backward method metode
e) Interesting conclusion.

3. RESULT AND ANALYSIS

3.1 Multiple Linear Regression Model with Matrix Approach

The value of the regression coefficient is calculated using a matrix.

From the above results obtained the value ((0 , 1, 2 , 3 , 4 , 5 , 6), then it can form The general formula for multiple linear regression is as follows:

Y=2710109.994+5970,712536 X 1 -50556.0824 X 2+783,8277963 X 3 -26346.8268 X 4 +351.1459899 X 5+244.198574 X 6

3.2 Multiple Regression Equation between Y and X 1, X 2 , X 3 X 4 , X 5 X 6

Multiple Regression Coefficient Between Y and X 1, X 2 , X 3 X 4 ,X 5 ,X 6 looking for similarities

multiple linear regression with SPSS.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2710109.944	7724606.719		.351	.731
Leftovers end of year	5870.713	3399.386	.256	1.727	.106
Land area	-50556.082	10779.144	-2.853	-4.690	.000
Rainfall	783.828	1202.047	.025	.652	.525
Rainy day	-26346.827	44660.232	-.028	-.590	.565
Seeds	351.146	725.827	.404	.484	.636
Fertilizer	244.199	97.474	3.164	2.505	.025

a. Dependent Variables: Rice paddy production

From result output above can be obtained b 0 = 2710109,944, b 1 = 5870.713, b 2 =-505556,082, b 3 =783,828 , b 4 =-26346.827 , b 5 =351.146 , b 6 =244.199

From the results above, it can be in the form of a multiple linear regression formula as follows: Y = 2710109.994+5870.70 X 1 -50556.082 X 2+783,828 X 3 -26346.827 X 4+351.146 X 5+244.199 X 6

3.3 Multiple Regression Significance Test

ANOVA results between Y and X 1, X 2 , X 3 X 4 , X 5 ,X 6

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	11829982887700130.000	6	1971663814616688.200	135.303	.000[b]
	Residual	204010333252254.660	14	14572166660875.332		
	Total	12033993220952384.000	20			

a. Dependent Variables: Rice paddy production b. Predictors: (Constant), Fertilizer, Rainy day, Rainfall, Year
a. Dependent Variables: Rice paddy production b. Predictors: (Constant), Fertilizer, Rainy day, Rainfall, Year

Based on the table output The SPSS above is known for the value of sig. is 0.000. Because value sig. 0.000 < 0.005, then the hypothesis is accepted. known value F count = 135,303 while the level value of real 0.05 obtained the value of F table = F(6,14) =2.85 because F count > F table then it can be concluded that coefficient means. To find out the coefficients that come out of the model, we can see from partial F values below.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	10977431117013264.000	1	10977431117013264.000	197.406	.000[b]
	Residual	1056562103939120.900	19	55608531786269.520		
	Total	12033993220952384.000	20			

a. *Dependent Variable*: Hasil produksipadi sawah

a. *Predictors: (Constant)*, Sisa tanam akhir tahun

From result output above can be seen the value of F Partial from X 6 Fertilizer = 277,868 with sig.
0.000.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	10896282218939466.000	1	10896282218939466.000	181.970	.000[b]

Residual	1137711002012918.200	19	59879526421732.540		
Total	12033993220952384.000	20			

. Dependent Variables: Rice paddy production Total 20
b. Predictors: (Constant), Land are

From result output above can be seen the value of F Partial from X 2 Land area = 181.97 with sig. 0.000 .

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1585803292553370.000	1	1585803292553370.000	2.884	.106[b]
	Residual	10448189928399014.000	19	549904733073632.300		
	Total	12033993220952384.000	20			

a. Dependent Variables: Rice paddy productionn
b. Predictors: (Constant), Rainfall
From result output t above can be seen the value of F Partial
from X Rainfall = 2.884 with3
ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	839159368718411.900	1	839159368718411.900	1.424	.247[b]
	Residual	11194833852233972.000	19	589201781696524.900		
	Total	12033993220952384.000	20			

a. Dependent Variables: Rice paddy production Total 20
b. Predictors: (Constant), Rainy day
From result output above can be seen the value of F Partial from X 4 Rainy days = 1,424 with sig.
0.247.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11394548994707588.000	1	11394548994707588.000	338.570	.000[b]
	Residual	639444226244796.100	19	33654959276041.902		
	Total	12033993220952384.000	20			

a. Dependent Variables: Rice paddy production
b. Predictors: (Constant), Seeds
From result output above can be seen the value of F Partial from X 5 Seeds = 338,570 with sig. 0.000.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11263798999095396.000	1	11263798999095396.000	277.868	.000[b]
	Residual	770194221856987.800	19	40536537992473.040		
	Total	12033993220952384.000	20			

a. Dependent Variable: Lowland rice production
b. Predictors: (Constant), Fertilizer
From result output above can be seen the value of F Partial from X 6 Fertilizer = 277,868 with sig.
0.000.

From the distribution list F obtained the value of F Partial smallest = 1.424 < F(6,14) = 2.85 on variable
X 4 i.e. a rainy day, because the value of F Partial is in the variable X 4 , then variable X 4 out of model. d. Determination Correlation Coefficient (Determination Index) The correlation coefficient of determination (the index of determination is expressed by R 2 to find out the value of R then see the output below:

3.4 Determination Correlation Coefficient (Determination Index)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.991[a]	.983	.976	3817350.73852

From result output above it can be seen that the value of R = 0.991 then the value of R 2 = 0.991 x 0.991 = 0.983 is called R squares. To find out the percentage of the estimator, the value of R 2 x 100%. 0, 983 x 100% = 98.3 %

This means that the value of the Y variation that can be explained by the method backward is 98.3% while the remaining 1.7% is influenced by other variables that are outside the model equation.

CONCLUSION

Of the six factors studied as factors that affect the production of lowland rice, then There are 4 predictive factors that greatly influence the year-end crop residue, land area, seeds, and fertilizers.
The estimating equation formed from the method backward is
Y = 788623,070 - 4979,786 X - 51051,961 X + 182,936 X + 264.100 X 1 2 5 6
X 1= End of year cropping
X 2 = Land area
X 5 = Seeds
X 6 = Fertilizer
based on the discussion of estimators, the results obtained from the percentage of variation described by the backward is 98.3% while the remaining 1.7% is influenced by other variables that are outside the model equation.

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