JMSCOWA 1 (2) (2020) Pages:. 69-79

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

Journal of Mathematics and Scientific Computing with Applications

Published: Pena Cendekia Insani

PROFIT OPTIMIZATION OF RICE FARMING BUSINESS ENTITIES IN JASMINE VILLAGE, DELI SERDANG

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Article Info

Article history:

Received April 19, 2020
Revised May 22, 2020
Accepted June 21, 2020

Keywords:

The Factors of Poverty, Cluster Analysis, Simplex Method

ABSTRACT

This study aims to optimize the yield from rice farming in Melati village. The results of the calculation of profit optimization using the simplex method. This research uses primary and secondary data. The problem in this study is the lack of capital and labor so that the results of agricultural income have not reached optimum due to the lack of raw materials needs by agriculture. The purpose of this research is to solve the problem of limited resources optimally by using linear functions and to find out how to apply them well in maximizing optimal profits.

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INTRODUCTION :

Rice is a rice-producing food crop commodity that holds Indonesia. Namely rice as a staple food is very difficult to replace by other staples. Among them are corn, tubers, sago, and other carbohydrate sources. So that the presence of rice becomes a top priority for the community in meeting the needs of carbohydrate intake which can be filling and is the main source of carbohydrates that are easily converted into energy. Rice as a food crop is consumed by approximately 90% of the total population of Indonesia for daily staple food (Saragih, 2001).

Spacing in rice cultivation with a transplanting system is one of the most important production factors as a determinant of achieving increased production. If the spacing is very dense, production costs will increase and if the plant population is very wide, it will eventually result in decreased crop yields (Suparwoto, 2010).

A large area of land can contribute to the amount of rice that will be planted. Extensive land will increase rice production and increase farmers' income. In this case, capital is the main factor in running a farming business, this has a great influence, without capital there will be no purchase of seeds or tools needed for rice business.

Melati Village is a village that has a large field of land so that it can be planted with rice, but with the problem of reduced capital so that only about 45 rante or 18,000 m2 is planted with rice. It is hoped that the results of this rice farming can increase the income of the villagers, especially for rice farmers and increase economic growth in this village.

LITERATURE REVIEW :

Optimization

Optimization is the achievement of the best state, namely the achievement of a problem solution that is directed at the maximum and minimum limits. Optimization can be done in two ways, namely maximization and minimization. Maximization is production optimization by using or allocating certain inputs to get maximum profit. While minimization is the optimization of production to produce a certain level of output by using the most minimal input or cost (Esther, 2013).

Linear Programming is a part of applied mathematics with a mathematical model consisting of linear equations or inequalities, which contains program actions to optimally solve various problems with limited resources. In the problem of determining the level of production of each type of product by showing the limits of production factors: machinery, labor, raw materials, and so on to obtain the maximum level of profit or minimum cost (Mughiroh, 2013)

The simplex method is the best technique for solving linear programming problems that do not have limitations in the number of decision variables and their constraint functions. This simplex algorithm is explained by using matrix algebraic logic in such a way that the calculations can be made more easily (Puryani and Ristono, 2012).

General Form of Linear Program Model

Optimize:

$$Z = \sum_{j=1}^{n} c_j x_j \qquad (2.1)$$

With limitations:

$$\sum_{j=1}^{n} a_{ij} x_j \geq \; \leq b_i, \qquad (2.2)$$

$$x_j \geq 0, \qquad (2.3)$$

Or it can be written in full as follows:

Optimize

$$Z = c_1 x_1 + c_2 x_2 + \ldots + c_n x_n \qquad (2.4)$$

With Constraints:

$$\begin{aligned} & a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n && (=, or \leq, or \geq) b_1 \\ & a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n && (=, or \leq, or \geq) b_2 \\ & \ldots \\ & a_{m1}x_1 + a_{m2}x_2 + \ldots + a_{mn}x_n && (=, or \leq, or \geq) b_m \\ & x_1, x_2, \ldots, x_n \geq 0 \end{aligned}$$

(Ismadi, 2013)

Information:

Z= The objective function for which the optimum value is sought (maximum, minimum)

C = increase in the value of Z if there is an increase in the level of activity xj by one unit or the contribution of each unit of output of activity j to Z

n = kinds of activities that use available resources or facilities

m= kinds of resource limitations or available facilities

xj= j activity level

= number of resources i needed to be allocated to each output unit of activity j

= capacity of resources i available to be allocated to each activity unit.

Terms in the Simplex Method

The terms in the Simplex Method according to Hotniar (2005) which are used in the simplex method include the following.

1. Iteration

   The calculation stage where the value in the calculation depends on the value of the previous table.

2. Non-basic variables

A variable whose value is set to zero at any iteration. In general terminology, the number of non-basic variables is always equal to the degrees of freedom in a system of equations.

3. Base variable
   A variable whose value is not zero at any iteration. In the initial solution, the base variable is either a slack variable (if the constraint function uses an inequality <) or an artificial variable (if the constraint function uses an inequality > or =). In general, the number of limiting variables is always equal to the number of limiting functions (without non-negative functions).
4. Solution or right value (NK)
   The limiting resource value that is still available. In the initial solution, the value of right or solution is equal to the number of existing initial constraining resources, because the activity has not yet been executed.
5. Variable slack
   A variable added to the mathematical model of the constraint to convert the < inequality into an equation (=). The addition of this variable occurs at the initialization stage. In the initial solution, the slack variable will serve as the base variable.
6. Surplus variable
   The variable that is subtracted from the mathematical model of the constraint to convert the > inequality into an equation (=). The addition of this variable occurs at the initialization stage. In the initial solution, the surplus variable cannot function as an independent variable.
7. Artificial variables
   Variables added to the mathematical model of the constraint of the form > or to function as initial base variables. The addition of this variable occurs at the initialization stage. This variable must be 0 in the optimal solution, because in fact this variable does not exist. This variable only exists on paper.
8. Pivot column (working column)
   The column containing the incoming variable. The coefficient in this column will be the right-hand divisor to determine the pivot row (work row).
9. Pivot row (work row)
   One of the rows from among the row variables containing the variable exits.
10. Pivot element (work element)
    The element that lies at the intersection of the pivot column and row. The pivot element will be the basis for calculations for the next simplex table.
11. Input variables
    The selected variable to be the basis variable in the next iteration. The incoming variable is selected one of the non-basic variables in each iteration. This variable in the next iteration will be positive.
12. Variable out
    Variables that come out of the base variable in the next iteration and are replaced with the incoming variable. The exit variable is chosen from one of the base variables in each iteration which has a value of 0.

RESEARCH METHODS

Types of research

The type of research used is case study research in Melati Village. This research was taken because it has constraints in optimizing income in crop yields. It begins by collecting various sources of linear programming using the simplex method such as journals, books, theses, then by collecting materials from the owners of rice farming business entities by taking samples. The data taken are primary and secondary data.

Research Time and Place

This research was conducted in Melati Village, Langsat Pakam Hamlet, Deli Serdang Regency, from January 2019 to completion.

Simplex Method Steps

Step 1: Changing the objective function and constraints
Step 2: Arrange the equations in the table
Step 3: Select the key column kolom
Step 4: Selecting the key row
Step 5: Change key row values
Step 6: Change the values in the key row

BB=BL-C (NBBK)

Information:
BB = New Row
BL = Old Row
C = Key Column Coefficient
NBBK = New Value of Key Row

Step 7 : Continue the fixes/changes.
Step 8 : Change the return key row values
Step 9 : Change the values other than the key row

RESULTS AND DISCUSSION :
Object of research
Rice farming is a business engaged in agriculture. This rice plantation is located in Melati Village, Langsat hamlet. This farm was founded in 2016 by Mr. Fikri Haikal Nst. This farm experiences yields 2-3 times a year. However, in 2017 income decreased, due to crop damage.

Calculation with the Simplex Method
I farm area of rice: 3,000,000
Land area II rice farmer: 6,000,000
Objective function for maximization:

$$Z = 3.000.000X_1 + 6.000.000X_2$$

Constraint function:

$$\begin{aligned} 25X_1 + 40X_2 &\leq 70 \\ 6X_1 + 12X_2 &\leq 20 \\ 10X_1 + 25X_2 &\leq 38 \\ 3X_1 + 5X_2 &\leq 10 \end{aligned}$$

Solution steps:
Changing the Purpose Function

In the objective function the equation is changed to negative like so: $Z = 3.000.000X_1 + 6.000.000X_2$ became $Z = -3.000.000X_1 - 6.000.000X_2$

In standard form, all variables have a sign. this inequality must be converted into equality. You do this by adding a Slack variable. Slack variables are variables that are added to the mathematical model of the constraint. Because the variables in the constraint function are started by X1 and, X2, the slack variable starts from (S_3, S_4, S_5, S_6)

$$\begin{aligned} 25X_1 + 40X_2 \leq 70 &\Rightarrow 25X_1 + 40X_2 + S_3 = 70 \\ 6X_1 + 12X_2 \leq 20 &\Rightarrow 6X_1 + 12X_2 + S_4 = 20 \\ 10X_1 + 25X_2 \leq 38 &\Rightarrow 10X_1 + 25X_2 + S_5 = 38 \\ 3X_1 + 5X_2 \leq 10 &\Rightarrow 3X_1 + 5X_2 + S_6 = 10 \end{aligned}$$

Variabel slack is (S_3, S_4, S_5, S_6)
Arrange the equations into a table
Based on the objective function and the constraint function in step 1, it can be written into Table 4.1, in line Z X_1 = 3.000.000, X_2 = 6.000.000 and the slack variable = 0 because there is no additional slack variable in the objective function. Then on the line S_3, X_1 = 25, X_2 = 40 and the addition of the slack variable, namely S_3 value 1, NK = 70, then S_6 S_4, S_5 value 0. On line S_4 coefficient on X_1 = 6 and X_2 =12 the coefficient of the slack variable is S_4 = 1, while the coefficient S_3, S_5, S_6 = 0 and NK = 20. On line S_5 coefficient X_1 = 10 and X_2 = 25, the coefficient of the slack variable is S_5 s 1, while the coefficient S_3, S_4, S_6 = 0 and NK = 38. And on the line S_6 coefficient X_1 = 3 and X_2 =5, the coefficient of the slack variable is S_6 is 1, while the coefficient S_3, S_4, S_5 = 0 and NK = 10. Pay attention to Table 4.1.

Table 4.1 Arranging Equations into Tables

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK
Z	1	-3.000.000	-6.000.000	0	0	0	0	0
S_3	0	25	40	1	0	0	0	70
S_4	0	6	12	0	1	0	0	20
S_5	0	10	25	0	0	1	0	38
S_6	0	3	5	0	0	0	1	10

Select key column
The key column is the column that has a negative value in row Z with the largest number. Based on data 4.1, the value in row Z, which has the largest negative value is in the variable, which is -6,000,000. then it becomes a key column. Pay attention to Table 4.2

Table 4.2. Marking Key Columns

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK
Z	1	-3.000.000	-6.000.000	0	0	0	0	0
S_3	0	25	40	1	0	0	0	70
S_4	0	6	12	0	1	0	0	20
S_5	0	10	25	0	0	1	0	38
S_6	0	3	5	0	0	0	1	10

Select key row

The key row is the row that has the smallest positive index number.
Based on Table 4.2, the column becomes the key column value, the key row is the row that has the smallest positive index number, in Table 4.3 row Z has NK = 0 and has a key column value = -6,000,000 so from the formula we get 0/- 6,000,000 = 0, then the row has NK = 70 and has a key column value = 40 then 70/40 = 1.75, then in the row has a NK value = 20 and a key column value = 12 then 20/12 = 1, 66, in the row having the value of NK = 38 and the value of the key column = 25 then 38/25 = 1.52, and in the row having the value of NK = 10 and the value of the key column = 5 then 10/5 = 2. So, from the calculation results from Table 4.3 the key row is in the row with an index value of 1.52.

Table 4.3. Calculating Least Index

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK	Indeks
Z	1	-3.000.000	-6.000.000	0	0	0	0	0	0
S_3	0	25	40	1	0	0	0	70	70/40= 1,75
S_4	0	6	12	0	1	0	0	20	20/12= 1,66
S_5	0	10	25	0	0	1	0	38	38/25= 1,52
S_6	0	3	5	0	0	0	1	10	10/5 = 2

Changing key row values

The key row is the row that has the smallest index, and the key number is the number in the row of the key column parallel to the row of the smallest index key

In Table 4.3, the key row is located in the row with the smallest index value = 1.52, and the key number = 25 which is located in the row of key columns (column row) and row row of keys (row). So in table 4.3 the key row in the variable is worth = 10 key digits = 25 then from the formula we get 10/25 = 2/5, then the key row in the variable is worth = 25 key digits = 25 then 25/25 = 1, then the key row in the variable is worth = 0 the key digit is worth = 25 then 0/25 = 0, the key row is the variable is worth = 0 the key number is = 25 then 0/25 = 0, the key row is the variable is worth = 1 key digit is = 25 then 1/25 = 1/25, then the key row on the variable is worth = 0 the key digit is worth = 25 then 0/25 = 0 and the key row on the NK is worth = 38 key digit is worth = 25 then 38/25 = 38/25 so the new row key values can be seen in the row in Table 4.4

Table 4.4 Changing the Value of the New Key Row

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK	Indeks
Z	1	-3.000.000	-6.000.000	0	0	0	0	0	
S_3	0	25	40	1	0	0	0	70	1,75
S_4	0	6	12	0	1	0	0	20	1,66
X_2	0	2/5	1	0	0	1/25	0	38/25	1,52
Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK	Indeks

S_6	0	3	5	0	0	0	1	10	2

Changing values other than key row

BB=BL-C (NBBK)

Information:
BB = New Row
BL = Old Row
C = Key Column Coefficient
NBBK = New Value of Key Row

In Table 4.4 the key row can be seen in row , the old row is a row other than the new row. In Table 4.4 the old rows are row Z, row , row , and row . The coefficient of the coefficient key column contained in the basic variable row, to change the value other than the key row in row Z, the coefficient in the key column is worth = -6,000,000, then the coefficient row in the key column is = 40, the coefficient row is the key column is 12 and the coefficient row in the key column is 5, and the new key row value (NBBK) is in row . So it can be concluded with this formula in a way, the coefficient in the key column is multiplied by NBBK, then the old row is subtracted from the result of the coefficient of the key column in times of NBBK. Then the calculation can be shown in Table 4.5

Row z

Row old line $\begin{pmatrix} -3.000.000 & -6.000.000 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}$

NBBK -6.000.000 $\begin{pmatrix} \frac{2}{5} & 1 & 0 & 0 & \frac{1}{25} & 0 & \frac{38}{25} \end{pmatrix}$ −

600.000 0 0 0 240.000 0 9.120.000

Row S_3

Row old line $\begin{pmatrix} 25 & 40 & 1 & 0 & 0 & 0 & 70 \end{pmatrix}$

NBBK 40 $\begin{pmatrix} \frac{2}{5} & 1 & 0 & 0 & \frac{1}{25} & 0 & \frac{38}{25} \end{pmatrix}$ −

9 0 1 0 -1,6 0 9,2

Row S_4

Baris Lama $\begin{pmatrix} 6 & 12 & 0 & 1 & 0 & 0 & 20 \end{pmatrix}$

NBBK 12 $\begin{pmatrix} \frac{2}{5} & 1 & 0 & 0 & \frac{1}{25} & 0 & \frac{38}{25} \end{pmatrix}$ −

1,2 0 0 1 -0,48 0 1,76

Row S_6

Row old line $\begin{pmatrix} 3 & 5 & 0 & 0 & 0 & 1 & 10 \end{pmatrix}$

NBBK 5 $\begin{pmatrix} \frac{2}{5} & 1 & 0 & 0 & \frac{1}{25} & 0 & \frac{38}{25} \end{pmatrix}$ −

1 0 0 0 -0,2 1 2,4

Table 4.5 Calculation table changing values other than key row baris

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK
Z	1	-600.000	0	0	0	240.000	0	9.120.000
S_3	0	9	0	1	0	-1,6	0	9,2
S_4	0	1,2	0	0	1	-0,48	0	1,76
X_2	0	2/5	1	0	0	1/25	0	1,52

S_6	0	1	0	0	0	-0,2	1	2,4

Continue the repairs (step 3-) until the Z line is not negative
In step 3, select the key column, row Z which has the largest negative value. In Table 4.5 row Z which has a negative value, the largest number is worth -600,000, then in step 4 choose the row lock row that has the smallest index. In Table 4.5 it is found in the row with the smallest index which is worth 1.52, then in step 5 change the values of the key row, by dividing the right value by the key number, the key number in Table 4.5 is in the column because row Z is negative. the largest is in the column . So from the results of the calculation of the smallest index key row, the row with index = 1.022 is shown in Table 4.6.

Table 4.6 Changes to the key row

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK	Indeks
Z	1	-600.000	0	0	0	240.000	0	9.120.000	-15,2
S_3	0	9	0	1	0	-1,6	0	9,2	1,022
S_4	0	1,2	0	0	1	-0,48	0	1,76	1,466
X_2	0	2/5	1	0	0	1/25	0	38/25	3,8
S_6	0	1	0	0	0	-0,2	1	2,4	2,4

Change row key values (return)
By dividing the key row by the key number, in Table 4.6 the key row changes in the index row and the key number changes in the column with a value of 9, then the value can be calculated by dividing the key row value by the key column value, it can be shown in Table 4.7. Row changes to because row Z which is negative from column changes in column . Then the conclusion is obtained in Table 4.7

Table 4.7 Change of return key row values

Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK	Indeks
Z	1	-600.000	0	0	0	240.000	0	9.120.000	
Var.Dsr	Z	X_1	X_2	S_3	S_4	S_5	S_6	NK	Indeks
X_1	0	1	0	1/9	0	-0,177	0	9,2/9	1,022
S_4	0	1,2	0	0	1	-0,48	0	1,76	
X_2	0	2/5	1	0	0	1/25	0	38/25	
S_6	0	1	0	0	0	-0,2	1	2,4	

Changing values
other than key row
Based on Table 4.7, the key row is in row , the old row is the row other than the new row shown in Table 4.7. The old rows are row Z, row , row , and row . Then the coefficient of the key column coefficients contained in the basic

variable row, then to change the value other than the key row in row Z, the coefficient in the key column is worth -600,000, then the coefficient row in the key column is 1.2, in row X2 the coefficient on the key column is 2/5 and the coefficient row in the key column is 1, and the new key row value (NBBK) is in row . So it can be concluded with a formula like step 6 by multiplying the coefficient in the key column by NBBK, then the old row is subtracted by the result of the coefficient of the key column multiplied by NBBK. Then the calculation can be shown in Table 4.8

Baris Z

Baris lama $\begin{pmatrix} -600.000 & 0 & 0 & 0 & 240.000 & 0 & 9.120.000 \end{pmatrix}$

NBBK -600.000 $\begin{pmatrix} 1 & 0 & \frac{1}{9} & 0 & -0,177 & 0 & 1,022 \end{pmatrix}$ –

0 0 66,666 0 133.800 0 9.733.200

Baris S_4

Baris lama $\begin{pmatrix} 1,2 & 0 & 0 & 1 & -0,48 & 0 & 1,76 \end{pmatrix}$

NBBK 1.2 $\begin{pmatrix} 1 & 0 & \frac{1}{9} & 0 & -0,177 & 0 & 1,022 \end{pmatrix}$ –

0 0 -0,133 1 -0,2676 0 0,5336

Baris X_2

Baris Lama $\begin{pmatrix} \frac{2}{5} & 1 & 0 & 0 & \frac{1}{25} & 0 & \frac{38}{25} \end{pmatrix}$

NBBK 2/5 $\begin{pmatrix} 1 & 0 & \frac{1}{9} & 0 & -0,177 & 0 & 1,022 \end{pmatrix}$ –

0 1 -0,044 0 0,1108 0 1,1112

Baris S_6

Baris Lama $\begin{pmatrix} 1 & 0 & 0 & 0 & -0,2 & 1 & 2,4 \end{pmatrix}$

NBBK 1 $\begin{pmatrix} 1 & 0 & \frac{1}{9} & 0 & -0,177 & 0 & 1,022 \end{pmatrix}$ –

0 0 -0,111 0 -0,023 1 1,378

Continuing improvements

From the calculation in step 9, the Z value no longer has a negative value, then the calculation cannot be continued anymore, so the results from Table 4.8 are already the optimal results, namely Z = Rp. 9,733,200.

Table 4.8 Table of Maximum Results obtained

Var.Dsr	Z	x_1	x_2	S_3	S_4	S_5	S_6	NK	Zmaks
Z	1	0	0	66,666	0	133.800	0	9.733.200	9.733.200

X_1	0	1	0	1/9	0	-0,177	0	1,022	
S_4	0	0	0	-0,133	1	-0,2676	0	0,5336	
X_2	0	0	1	-0,044	0	0,1108	0	1,1112	
S_6	0	0	0	-1/9	0	-0,023	1	1,378	

Based on Table 4.8 the results obtained from calculations using the simplex method are:

So the value of these benefits can be concluded:
Z = 3,000,000 X1 + 6,000,000 X2
= 3,000,000(1,022) + 6,000,000(1,1112)
= 3,066,000 + 6,667,200
= Rp. 9,733,200

From the results of the calculation of agricultural production by rice farmers in Melati Village Deli Serdang with calculations using the simplex method with rice farming planting materials such as seeds with a supply source of 70 kg, fertilizer with a supply source of 20 sacks, pesticides with a supply source of 38 bottles, and poison. powder with a supply source of 10 packs, it can be concluded that, The increase in profit is Rp. 733,200 of profit Rp. 9,000,000 to Rp. 9,733,200

CONCLUSION:

Based on the results of the discussion of rice farming work in Melati Village, Deli Serdang using a linear program using the simplex method, it can be concluded:
The profit obtained from the rice farmer's work agency business in Melati Village increased by Rp. 733,200 from the initial capital of Rp. 9,000,000. The difference from the profit is Rp. 733,200
The simplex method can be used as a problem solving solution in optimizing for profit.

REFERENCES

[1] Astuti, N. E. D., Linawati, L., & Mahatma, T. (2013). Penerapan model linear goal programming untuk optimasi perencanaan produksi. In *Prosiding Seminar Nasional Sains dan Pendidikan Sains Fakultas Sains dan Matematika UKSW* (Vol. 8, No. 4, pp. 464-471).

[2] Firmansyah, F., Panjaitan, D. J., Salayan, M., & Silalahi, A. D. (2018). Pengoptimalan keuntungan badan usaha karya tani di deli serdang dengan metode simpleks. *JISTech (Journal of Islamic Science and Technology)*, *3*(1).

[3] Firmansyah, F., & Aprilia, R. (2018). ALGORITMA MODEL PENENTUAN LOKASI FASILITAS TUNGGAL DENGAN PROGRAM DINAMIK. *ALGORITMA: JURNAL ILMU KOMPUTER DAN INFORMATIKA*, *2*(1).

[4] Ismadi, Janu.2013. Pemecahan Masalah Program Linear. Banten: Talenta Pustaka Indonesia

[5]Indrawati, I., Octarina, S., & Suwandi, N. (2012). Aplikasi Metode Simpleks pada Produksi Padi di Kabupaten Ogan Ilir Serta Analisis Kelayakan Produksi Secara Sensitivitas. *Jurnal Penelitian Sains*, *15*(2).

[6]Mentari, A. M. (2019). *Optimasi Keuntungan Menggunakan Linear Programming Metode Simpleks Berbantuan Software Lindo pada Home Industry Bintang Bakery di Sukarame Bandar Lampung* (Doctoral dissertation, UIN Raden Intan Lampung).

[7]Puryani., dan Ristono, A. 2012. Penelitian Operasional. Graha Ilmu, Yogyakarta.