Optimization of Smallholder Palm Oil in Nagan Raya and Aceh Tamiang Aceh Province

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Abstract

This study aims to identify and analyze the optimum use of the available resources in smallholder farm palm oil in Nagan Raya and Aceh Tamiang Aceh Province. The data used in this study is the input-output data of smallholder palm oil, and other agricultural resources. The secondary data was obtained from the Central Statistics Agency, as well as from several research results and the annual report of the Department of Forestry and Plantation of Aceh Province, also other agencies associated with this research. The primary data of this research was obtained directly from the field, either through a verbal interview to the respondents as well as through questionares. An optimization linear programming technique with resources constraints was used in order to seek the optimal allocation solution to answer the problem which is the Output Unit Price Cobb-Douglass Profit Function Model. Then the model was analyzed using Cobb-Douglass Profits Function Model which are developed by the Cobb-Douglass. Regression estimation of profit or the aggregated profit of the palm oil plantations is affected by factors of land, number of plants, capital, fertilizer, medicine, labor, and experience, as well as the cost of each of these factors. All of these variables influence the profit of palm oil plantation and are sufficient to explain the variations in the profit. The research findings indicate that the use of resources in palm oil farming in Aceh Tamiang and Nagan Raya has not been optimal. By looking at the sensitivity analysis, palm oil farmers need to carefully consider the factors influence profit, which includes land, number of plants, capital, fertilizer, medicine, labor, experience of smallholders (including the cost of resources). This study depart from previous study by exercising farmer experience variable. The latter variable is the most importance variable to contribute the amount of profit, which is the novelty of this research. Failure to use the limited input resources effeciently would make the profit has not been maximization. In this case, handle directly by the role of government is needed, especially to intervene in matters which are difficult to reach farmers, for example, the addition of business land, subsidized seeds and fertilizers, as well as improvement to farmers capability to manage agricultural resources more optimally through agriculture extension or improvement of experienced partner.

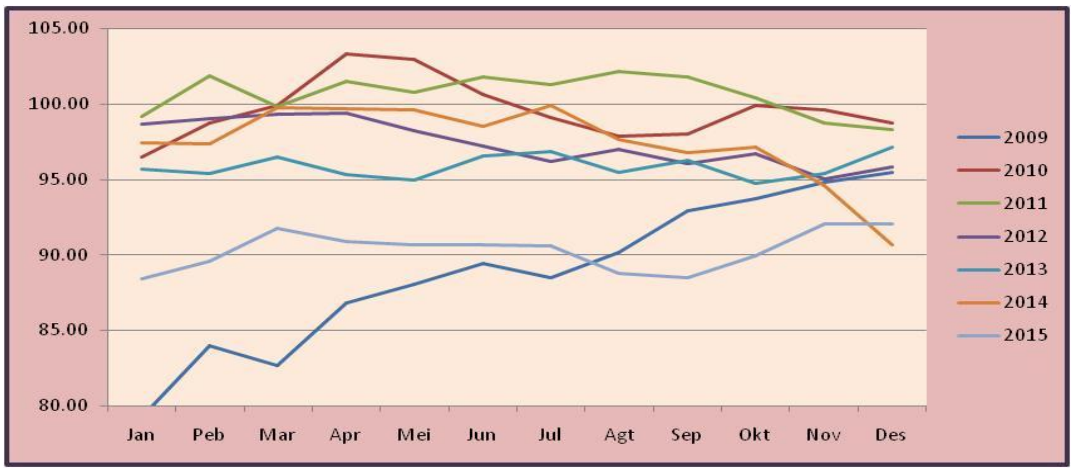
Keywords: palm oil, profit, optimization

1. Introduction

Poverty in underdeveloped countries are largely located in rural areas. Lifting people out of poverty, requires an increase in productivity. Although various poverty alleviation programs could be launched in the short term, but in the long term is still needed job creation and wage increases in the agricultural sector. Toughness agricultural sector was proud at the height of the financial crisis, finally no longer able to survive as agricultural development and economic transformation process can not be solely based on rising prices or inflation alone. Supporting industries and services sector, which has been able to offset the increase in aggregate demand due to population growth, now there has been recovered due to low investment, capacity and production activity is expected to expand employment opportunities.

Investment in the agricultural sector are often very expensive, plus the returns are so low that sometimes is not very attractive to the private sector. Therefore, development of irrigation, agricultural extension and various forms of investment in the form of other subsidies should be done by the government. But among the sub-sectors of sub-sectors in agriculture, plantation sub-sector is excellent for many agricultural commodities, such as oil palm, cocoa and rubber is the main foreign exchange earner of the agricultural sector.

The fall of the rupiah against foreign currencies (US Dollar) led to acceptance of farmers and planters to increase, while on the other hand costs, farmers and planters expenses also increased due to higher prices of fertilizers and pesticides. But palm oil commodity prices is also often mengalani price fluctuations in the international market. The following figure shows the exchange rate farmers for the plantation sector Aceh Province from 2009 to 2015.

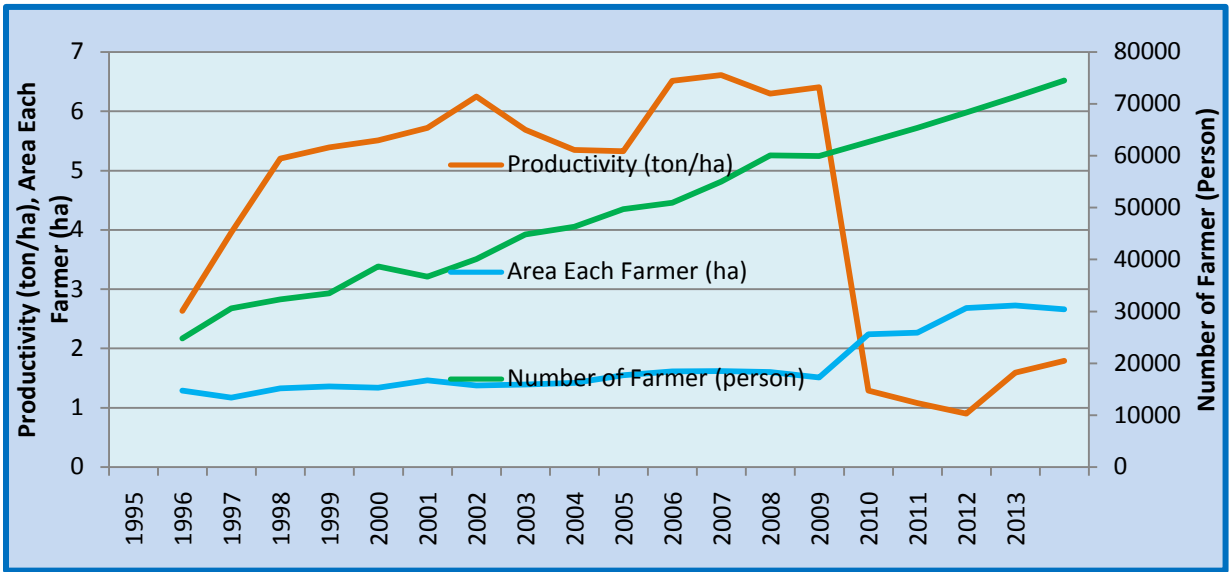


Source: Statistics Agency of Aceh Province

Figure 1. Farmer in the Agricultural Sector Aceh Province, 2009-2015 (Monthly)

In this figure, it appears that over the last seven years from 2009 to 2015 (in 2008 the exchange rate farmers = 100). Farmer estate sector always fluctuate, and in recent years under 100, and why it happened unoptimality resource management in oil palm farming.

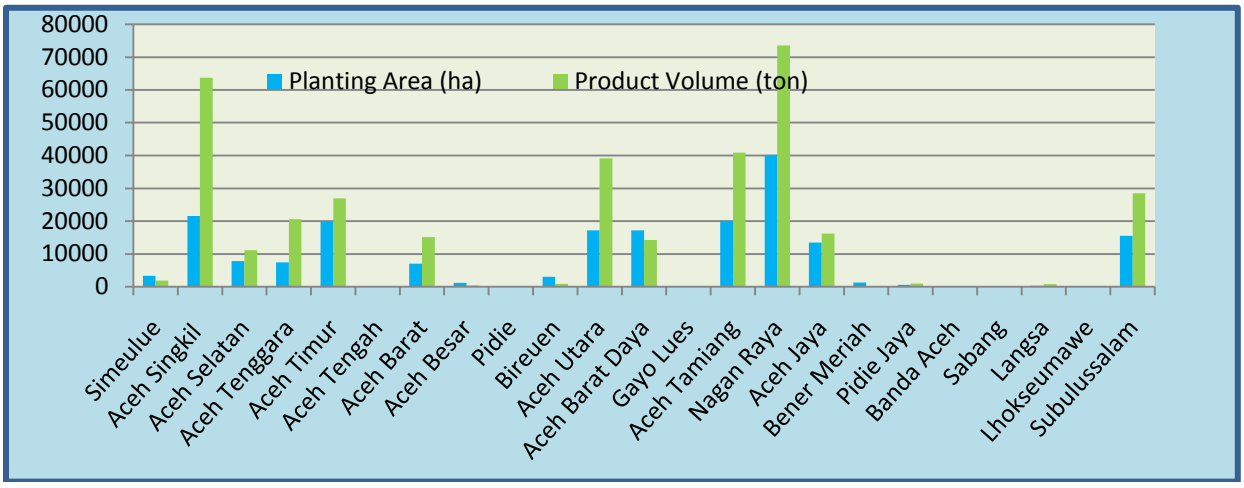
A large number of workers in the plantation sector sub folk for palm oil will also affect the level of production. Production produced can be used as an incentive to increase labor productivity in the sector. If the resulting production increases, the level of labor productivity in the sub-sector community plantations for palm oil has also increased.



Source: Department of Forestry and Plantati 2014 (processed).

Graph 2. Average Productivity, Total Area average per farmer and Number of Palm Oil Growers People in Aceh province Years 1995-2013

In the picture looks over the period 1995 to 2013 shows that the area of the average per farmer has increased, so did the number of farmers who are trying on farm commodity palm oil, yet the increase was not accompanied by an increase in average productivity tonnes per hectares. Of course this is an issue the used resources in oil palm farming has not been optimal, so it does not provide profit to farmers.



Source: Department of Forestry and Plantations, 2014

Figure 3. Total Area Planted (ha) and Production (tons) Oil Palm Plantations By Regency/City in the Province of Aceh in 2013

Based on the following picture is also seen that the acreage and production of palm oil in Nagan Raya and Aceh Tamiang is the acreage and production of oil palm highest in Aceh

Province, but productivity tons per hectare experiencing fluctuation. Therefore suspected use of the available resources in the palm oil farming in the two districts has not been optimal.

2. Literature Study

In a production process, the relationship between the factors of production (input) with output in physical form shown by the production function. The production function is an equation that includes factors of production such a way that for every combination of certain factors of production there are only a certain number of results. Factors of production that can be controlled largely determines the success of a farmer. Herman (1996: 158), stating that the recognition and understanding of the principal elements of farming to be very important, especially regarding the selection and control of the factors of production. The factors of production that can be controlled by humans, there are four basic elements (land, labor, capital and technology) and plus one non-physical element, that education is always there on the farm.

Demand factors of production as well as the demand for goods and services, is the relationship between the quantity of factors used and the price level. Production factor demand function is a function that provides the optimal choice of input factors. The demand for factors of production is the result of the derivation of the underlying product demand and production functions. Demand for goods and X represents the quantity of X demanded as a function of price alone (w) and the price of the product (p). Function request input factors can be obtained from the first derivative equal to zero from profit maximization (Beattie and Taylor, 1994: 120).

While the product offering is a function that provides the optimal selection of the output which is the prices of input factors (w), called the supply function. Product supply function in a perfectly competitive market states that the quantity of products to be produced as a function of the price of the product. Besides the quantity of product being offered is also a function of the price factor. The function offers a profit-maximizing companies can be derived from the first order condition for maximizing profits. In other words, to obtain product supply function can be obtained from the derivation function of profits.

One problem faced by any company is how they control resources should be used to achieve economic efficiency. Gain or loss is the difference between sales revenue and production costs, profits obtained if the sale proceeds greater than the cost of production. One kind of problems often encountered in the economic field is an optimization problem. Optimization problem involves finding the value of "optimum" a function of one or several variables. So, in any optimization problem always has to be a function that should be optimized value.

Wawe, et al, (2008), wrote about the optimum planning for palm oil and its combination with the use of linear models programasi in Nigeria, where the results of the study states that the use of combinations of inputs of land, capital and labor efficient will benefit for farmers. The study results also showed farmers' income rose on average by 69% over five years. Sudjarmoko (2010) investigated the factors that affect profitability and efficiency in the palm of people's business, by using Model Output Unit Price Cobb - Douglass Profit Function. The model was then analyzed using Seemingly Unrelated procedure Regrssion (SUR). The analysis showed that the level of wages, the prices of fertilizers and pesticides had a significant impact negatively on profits. Ogunkoya and Aderoba (2010) writes about a process model for the optimization of small-scale industrial production competition in Nigeria. Research results mention that sebahagian small-scale industries are not flexible in the production process and it is difficult to achieve optimum production, in which the input price fluctuations. With the approach of the

linear program output results obtained with optimum profits and fluctuations in the variable costs. Ezealaji (2012) investigated the optimal pattern of palm oil shipments that minimizes the total cost of transportation in Imo Nigeria, and by using linear models proggramming to determine the optimal pattern of palm oil distribution marketing area of origin to palm oil demand by minimizing transportation costs. Murugan, et.al, (2013) developed a linear programming models for palm oil mills in order to optimize production planning related to demand and supply patterns and minimizing production costs.

3. Methodology

3.1. Data

The scope is examined in this study is limited to coconut farming palm oil in Nagan Raya and Aceh Tamiang Aceh Province. .From palm oli commodity will be seen hence the profitability of palm oil commodity, also seen the use of resources, whether it is optimal or not optimized with various constraints. In this study, palm oil commodity is taken from palm oil commodity aged 4-15 years.

The data used in this study is the data input-output commodity farming palm oil, and other agricultural resources. The data is secondary data from the Central Statistics Agency, and some research results as well as the annual report of the Department of Forestry and Plantation Aceh Province, also came from other agencies associated with this research. In addition it also used primary data which will be obtained directly from the field, either through a direct interview to the respondents as well as through a list of questions (questionnaires) were given to respondents.The population in this study were farmers for palm oil plantations people in Nagan Raya and Aceh Tamiang Aceh Province amounted to 18 337 people. Based on the number of the population, it can be done sampling. The large sample size in this study is based on a formula Slovin (Sevilla et.al., 1993, 161), namely: $\mathbf{n = \frac{N}{1+Ne^2}}$

With a population berjumlah18.377 palm oil farmers and e (level of accuracy) 10 percent, the number of samples required is 100 farmers.

3.2. Model

The model used in this study to answer the problem is the model Output Unit Price Cobb-Douglass Profit Function and Function translog. The model is then analyzed using a production function model, which was adopted by Mandaka and Hutagaol (2005), as well as Sudjarmoko (2010). The production function:

$Y = f (X1, X2, ...,Xm; Z1, Z2, ..., Zn)$ .... (1)

While the function of advantages:

$$\Pi = pf (X1, X2, ...,Xm; Z1, Z2, ..., Zn) - \sum_{i=1}^{m} Wi\ Xi$$ .... (2)

Where :

Π: advantages

p: the price per unit of output

Xi: input does not keep all i (i = 1,2, ..., m)

Zi: fixed to the input-j (j = 1,2, ..., n)

Wi: input prices are not fixed to-i

Maximum profit is achieved at a value equal to the marginal production input prices. Mathematically it can be written as follows:

$$P \frac{\delta f(X1, X2, ..., Xm; Z1, Z2, ..., Zn)}{Xi\ \delta} = Wi \quad \text{..... (3)}$$

If the equation (3) normalized by the price of output, obtained the following equation:

$$P \frac{\delta f(X1, X2, ..., Xm; Z1, Z2, ..., Zn)}{Xi\ \delta} = Wi^* \quad \text{..... (4)}$$

Where $Wi^* = Wi / p$ = price of input i-th normalized with the output price. If equation (2) normalized by the price of output, obtained by the following equation:

$$\Pi^* = \Pi / p = f(X1, X2, ...,Xm; Z1, Z2, ..., Zn) - \sum_{i=1}^{m} Wi^* Xi^* \quad \text{..... ..... (5)}$$

Where Π^* is known as profit function UOP (Unit Output Price Profit Function). The optimal number of input Xi modifiers that provide maximum benefit can be derived from equation (4), namely:

$$\Pi^* = f(Z1, Z2, ..., Zn; W1, W2, ..., Wm) \quad \text{..... ..... (6)}$$

Substituting (6) into the equation (2) will receive:

$$\Pi = pf(X1, X2, ...,Xm; Z1, Z2, ..., Zn) - \sum_{i=1}^{m} Wi^* Xi^* \quad \text{..... ..... (7)}$$

Because as a function of Xi * Wi * and Zi, the equation (7) can be written as follows:

$$\Pi = p\ G^*(Z1, Z2, ..., Zn; W1, W2, ..., Wm) \quad \text{..... ..... (8)}$$

Equation (8) is a function of the benefits that the maximum value of the gain for each output prices, input prices are not fixed Wi and Zi fixed input level. If the equation (8) normalized with the output price, then obtained:

$$\Pi^* = \Pi / p = G^*(Z1, Z2, ..., Zn; W1, W2, ..., Wm) \quad \text{..... ..... (9)}$$

Equation (9) is a UOP profit function as a function of input prices are not fixed are normalized with the output price and the number of fixed inputs. Specifications profit function used is function of Cobb-Douglass profits derived by the Cobb-Douglass. Through the process of reduction of equation (1) to the equation (9), the obtained function Cobb-Douglass profit as follows:

$$\Pi^* = A^* + \sum_{i=1}^{7} \sum_{j=1}^{n} \alpha i\ ZJJ^* + \sum_{i=1}^{7} \sum_{j=1}^{n} \beta j\ Wij^* \quad \text{..... ..... (10)}$$

Where :

A *:intercept

Π *:profit farmers (Rp)

Z1: land area (Ha)

Z2: number of plants (Trunk)

Z3 : capital (Rp)

Z4 : fertilizer (Rp)

Z5: medicine (Rp)

Z6: labor (people)

Z7: experience (years)
W1 *: cost of land (Rp / ha)
W2 *: cost of the number of plants (Rp / rod)
W3 *: cost of capital (Rp / ha)
W4 *: cost of fertilizer (Rp / rod)
W5 *: cost of medication (Rp / rod)
W6 *: cost of labor (Rp / person)
W7 *: cost of experience (Rp / year)
αi: coefficient input
βi: coefficient input prices

Profit Maximization :

Advantages can be gained from total revenue (Total Revenue = TR) minus total cost (Total Cost = TC). Linear programming model is simple not include the time factor, the mathematical models can be created as follows:

(1). Objective Function

$$\text{Max } \Pi^* = A^* + \sum_{i=1}^{7}\sum_{j=1}^{n} \alpha i \, ZJJ^* + \sum_{i=1}^{7}\sum_{j=1}^{n} \beta j \, Wij^* \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (11)$$

(2). Constraint Function

i. For Farmers Overall

a. Land area : $\overline{Z}_1 \le Z_{1i} \le \sum_{i=1}^{n} Z_{1i}$

b. Number of plant : $\overline{Z}_2 \le Z_{2i} \le \sum_{i=1}^{n} Z_{2i}$

c. Capital : $\overline{Z}_3 \le Z_{3i} \le \sum_{i=1}^{n} Z_{3i}$

d. Fertilizer : $\overline{Z}_4 \le Z_{4i} \le \sum_{i=1}^{n} Z_{4i}$

e. Medicine : $\overline{Z}_5 \le Z_{5i} \le \sum_{i=1}^{n} Z_{5i}$

f. Labor : $\overline{Z}_6 \le Z_{6i} \le \sum_{i=1}^{n} Z_{6i}$

g. Experience : $\overline{Z}_7 \le Z_{7i} \le \sum_{i=1}^{n} Z_{7i}$

h. Cost of land : $\overline{W}_1 \le W_{1i} \le \sum_{i=1}^{n} W_{1i}$

i. Cost of plant : $\overline{W}_2 \le W_{2i} \le \sum_{i=1}^{n} W_{2i}$

j. Cost of capital : $\overline{W}_3 \le W_{3i} \le \sum_{i=1}^{n} W_{3i}$

k. Cost of fertilizer : $\overline{W}_4 \le W_{4i} \le \sum_{i=1}^{n} W_{4i}$

l. Cost of medicine : $\overline{W}_5 \le W_{5i} \le \sum_{i=1}^{n} W_{5i}$

m. Cost of labor : $\overline{W}_6 \le W_{6i} \le \sum_{i=1}^{n} W_{6i}$

n. Cost of experience : $\overline{W}_7 \le W_{7i} \le \sum_{i=1}^{n} W_{7i}$

ii. For Individual Farmers

a. Land area : $\overline{Z}_1 \le Z_{1i} \le \max Z_1$

b. Number of plant : $\overline{Z}_2 \le Z_{2i} \le \max Z_2$

c. Capital : $\overline{Z}_3 \le Z_{3i} \le \max Z_3$

d. Fertilizer : $\overline{Z}_4 \le Z_{4i} \le \max Z_4$

e. Medicine : $\overline{Z}_5 \le Z_{5i} \le \max Z_5$

f. Labor : $\overline{Z}_6 \le Z_{6i} \le \max Z_6$

g. Experience : $\overline{Z}_7 \le Z_{7i} \le \max Z_7$

h. Cost of land : $\overline{W}_1 \le W_{1i} \le \max W_1$

i. Cost of plant : $\overline{W}_2 \le W_{2i} \le \max W_2$

j. Cost of capital : $\overline{W}_3 \le W_{3i} \le \max W_3$

k. Cost of fertilizer : $\overline{W}_4 \le W_{4i} \le \max W_4$

l. Cost of medicine : $\overline{W}_5 \le W_{5i} \le \max W_5$

m. Cost of labor : $\overline{W}_6 \le W_{6i} \le \max W_6$

n. Cost of experience : $\overline{W}_7 \le W_{7i} \le \max W_7$

Where :
Π : Maximum Profit
Zij : Resources i-th to j-th observation
Wij : The cost of the resource i-th to j-th observation
Z1j : Land area used by farmers j-th
Z2j: Number of plant farmers j-th
Z3j : Capital used by farmers j-th
Z4j Fertilizers used by farmers j-th
Z5j: Medicine used by farmers j-th
Z6j: Labor used by farmers j-th
Z7j: Experience in farming farmers j-th
$\overline{Z}_i$: The average value of observation for the variable i-th
$\overline{W}_j$: The average value of observation for the variable j-th

$\max \overline{Z}_i$: The maximum value observed for the variable i-th

$\max \overline{W}_i$: The maximum value observed for the variable i-th

4. Results and Discussion

4.1. Estimated Regression Model Advantage Oil Palm Smallholders

Advantages petanit palm oil aggregates is influenced by factors of land (Z1), the number of plants (Z2), and capital (Z3), fertilizers (Z4), medicine (Z5), labor (Z6), experience (Z7), as well as price each of these factors, namely cost of land (W1), the cost of the plant (W2), cost of capital (W3), the cost of fertilizer (W4), the cost of medicine (W5), the cost of labor (W6), and the cost of the experience (W7). F count> F table (α; 14.85) (326.985> 1.83), so that there is statistically reject H0 profit oil palm farmers in the aggregate affected by these factors.

In the table of model estimation indicated that the determination coefficient reached 0.982. This means that in this model the palm farmer profit of 98.2 percent determined by land area (Z1), the number of plants (Z2), and capital (Z3), fertilizers (Z4), medicine (Z5), labor (Z6), experience (Z7), as well as the price of each of these factors, namely the cost of land (W1), the cost of the plant (W2), the cost of capital (W3), the cost of fertilizer (W4), the cost of medicine (W5), the cost of labor (W6), and the cost of the experience (W7). While 1.8 percent is influenced by other variables not included in the model, such as the environmental factors / social (security).

All the variables in the aggregate affect farmers' profits are not all palm oil partially real effect. The number of plants, capital, fertilizer, labor, and experience, as well as the cost of land, cost of plant, and the cost of experience are variables that influence with a confidence level above 95%. While cost of land and cost of labor real influence with confidence level of 90% only. While variable medicine, the cost of capital, the cost of fertilizer, and the price of medicines having an independently not significantly affect profitability of the palm oil.

Area is used greatly affect the profitability of the oil palm. If incremented by one unit (1 hectare), sp the profit palm oil growers will increase to Rp 3,845,079 assuming other variables remain. The number of cultivated plants also will determine the profitability of palm oil are produced. The addition of one unit of the plant (the trees) will increase farmer profits of Rp 57 483, assuming other variables unchanged. The number of plants has the greatest confidence level after the variable experience, meaning that if farmers add 1 plant, the 99% profit oil palm farmers will increase this amount.

Capital provides a real impact on the profitability of palm oil farmers. If the palm oil growers to add input to the capital by 1 unit, then the profitability of oil palm will grow to a record 0.611 units other variables are constant. Suppose that 10 million farmers have to raise capital, then 99% of farmers' profits grow by 6 million.

Fertilization matching will increase the profits of farmers, it is evident from the regression model that the addition of 1 unit of fertilizer will increase farmers' profits palm 4 units. This means that if farmers allocate more fertilizer inputs by 1 rupiah, so the profit oil palm growers will increase to 4.19 rupiah. The use of medicine is more important for the development of palm oil, as if the plants infested by pests then to necessarily be a direct impact on farmer profit. Although in partial, variable drugs had no significant effect, but its role is quite important in keeping the plant fitness. Soppose significance is negligible, the use of one rupiah input for the medicine will increase profitof farmers amounted to 9.20 rupiah.

Furthermore, labor, labor is an essential factor that must exist in business activities include oil palm plantations. With a significance level of 5%, the use of one unit of labor will increase profit farmers Rp 4,378,648 assuming other variables unchanged. Factors that are not less important is the experience, because it is the key variable experience in palm oil plantations. The more experience, of course the larger the capacity and expertise in managing the business. Hard earned experience even supposing someone does not diligently and lazy to work hard. Therefore, the value of the experience will be higher or expensive in line with the level of experience a person has.

In the model estimated profit oil palm growers, variable experience have the highest confidence level of 99 percent. The addition of 1 unit will experience increased profits for palm oil farmers as much as 6,066,729.942 units. Suppose a person's palm oil farmers add to the experience of 1 year, it will be very potentially increase profit oil palm farmers Rp 6.06673 million assuming other variables remain. Planters one's experience in managing this business will make more efficient use of resources and optimal.

Table 1. Estimated Profit Function

Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
1 (Constant)	26526035,541	34440331,113		,770	,443	
land (Z1)	3845079,387	2138459,285	,144	1,798	,076	*
plant (Z2)	57482,944	15598,678	,290	3,685	,000	***
capital (Z3)	,611	,224	,063	2,724	,008	***
fertilizer (Z4)	4,190	1,259	,175	3,328	,001	***
medicine (Z5)	9,203	10,874	,040	,846	,400	
labor (Z6)	4378648,073	2172733,960	,062	2,015	,047	**
experience (Z7)	6066729,942	1394369,190	,155	4,351	,000	***
cost of land (W1)	-15,157	7,589	-,037	-1,997	,049	**
cost of plant (W2)	-1607,097	717,175	-,038	-2,241	,028	**
cost of capital (W3)	-,148	3,477	-,001	-,042	,966	
cost of fertilizer (W4)	-14,130	1078,113	,000	-,013	,990	
cost of medicine (W5)	-1883,327	13298,026	-,003	-,142	,888	
cost of labor (W6)	-6,044	3,598	-,039	-1,680	,097	*
cost of experience (W7)	1,317	,376	,143	3,501	,001	***

a. Dependent Variable: tingkat keuntungan (∏)

b. Predictors: (Constant), Land (Z1), Plant (Z2), Capital (Z3), Fertilizer (Z4), Medicine (Z5), Labor (Z6), Experience (Z7), Land Cost (W1), Plant Cost (W2), Capital Cost (W3), Fertilizer Cost (W4), Medicine Cost (W5), Labor Cost (W6), Experience Cost (W7)

*** sig. α=0,01	R^2 = 0,982 Adj R^2 = 0,979
** sig. α=0,05	F_{hitung} = 326,985

* sig. α=0,10	DW = 2,000

Source: Data Processing Results

In addition to the number or amount of input resources, the cost of each component also affect the resource advantages of palm oil growers. The cost of land, cost of plant and other input costs in general will determine the profit farmers. Cost component inputs are typically in line with its quality, as well as the characteristics of the component itself. Land prices, for example, if one farmer buys 2 units of land units, would be different from someone farmer who bought land as much as 10 or 20 individual units with the same quality of land. However, there will be other factors that affect the cost of the land, for example the time.

Partially land cost negatively affect the profitability of the palm oil. This means that if the cost of land increase by 1 unit the unit, it will reduce profit by 15 units of a unit with a record of other variables unchanged. Price Sycamore seedlings of palm oil plantations also influence farmers' profits. Partially increase in the cost of one unit of the plant will reduce the profits of farmers as much as 1883 units units, assuming other variables remain. Suppose the cost of seed plants increase 1 rupiah, then potentially reduced profitability of Rp 1,607 rupiah with a confidence level of 95 percent.

The cost for the capital components, fertilizers, and medicine partially no significant influence on farmers' profits. Although these three variables can reduce farmers 'profits, but not statistically significantly influence farmers' profits. As previously input component costs, the cost of labor has a negative influence on farmers' profits. With a confidence level of 90 per cent, if the wages go up one unit of the profitability of the unit is reduced by 6 units.

The reality is different happens to the cost of experience variable, because only the cost of the experience had a positive influence on the profitability of farmers with an error rate of 1 percent. This condition makes the fact that if the price increase experience then it would be in line with the capabilities and expertise in managing palm oil plantations. His experience is able to increase farmers' profits are higher than the cost of the experience itself. In the estimation of the above model, cost increases by 1 unit of experience will be able to increase the profit 1.32 units.

4.2. Profit Optimization Palm Oil

This function is used to maximize profits with limited resources available. The hypothesis we expect that the use of resources in the oil palm plantations has not been optimal. In general will be discussed from two perspectives, namely farmers and the whole of the side of each farmer individually.

Table 2.Descriptive Statistics Variable

Variable	N	Minimum	Maximum	Sum	Mean
Land (Z1)	100	2	23	644	6,44
Plant (Z2)	100	225	3300	87444	874,44
Capital (Z3)	100	9500000	90000000	2730500000	27305000,00
Fertilizer (Z4)	100	2050000	25500000	795970000	7959700,00
Medicine (Z5)	100	122000	2700000	74268000	742680,00
Labor (Z6)	100	1	12	313	3,13
Experience (Z7)	100	4	19	703	7,03

Cost of land (W1)	100	1187500	2962500	192911385	1929113,85
Cost of plant (W2)	100	12000	28810	1922502	19225,02
Cost of capital (W3)	100	1011111	4720000	243260692	2432606,92
Cost of fertilizer (W4)	100	2889	14895	905533	9055,33
Cost of medicine (W5)	100	395	1222	80673	806,73
Cost of labor (W6)	100	500000	3725000	182441707	1824417,07
Cost of experience (W7)	100	5700000	67200000	2497274471	24972744,71
Profit	100	50500000	579000000	17.449.570.000	174495700,00
Valid N (listwise)	100				

Source: Research Findings

Profit Optimization with Constraint Function I (Farmers Overall)

From this point of view, the object of observation farmers seen as a whole. Therefore function is limited by the constraints of the average value and the cumulative all observations for each variable. The value of the coefficient derived from the estimated regression models were discussed in the previous section.

On models with Constraint Function I (Farmers Overall), the value of profit optimization results of Rp 17.776 billion. The value of Rp 326.24 million more than the current profit of Rp 17.45 billion. In more detail available land resources must be used all of them, amounting to 644 hectares. Similarly, the number of palm trees that must be planted some 87 444 rods, all of which are available to farmers. capital, fertilizers, medicine, as well as the workforce was entirely should be used to obtain the maximum profit. However, for variable experience, it would be better if the experience of palm oil entrepreneurs 7 years. Although more and more experience a person has the ability and expertise of farmers are getting better, but the cost they pay even greater. so feared could make a profit is not optimal and recommended that experience the farmer for 7 years.

Table 3. Results Profit Function Optimization with Constraint Function I (Farmers Overall)

VARIABLES	SOLUTION		C0EFFICIENTS
land (Z1)	644		3.845.079,387
plant (Z2)	87.444		57.482,944
capital (Z3)	2.730.500.000		0,611
fertilizer (Z4)	795.970.000		4,190
medicine (Z5)	74.268.000		9,203
labor (Z6)	313		4.378.648,073
experience (Z7)	7		6.066.729,942
land cost (W1)	1.929.114		-15,157
plant cost (W2)	19.225		-1.607,097
capital cost (W3)	2.432.607		-0,148
fertilizer cost (W4)	9.055		-14,13
medicine cost (W5)	807		-1.883,327
labor cost (W6)	1.824.417		6,044

experience cost (W7)	2.497.274.471		1,317
		VALUES	**17.775.807.887**

Source: Data Processing Results

Furthermore, to variable input prices, almost all of them are advised to use a minimum cost (the average cost) because it has a negative effect on profit. Unless the cost of variables influence a different experience (positive), the experience is recommended to use all of them to earn maximum profit palm oil. Thus, the hypothesis that the use of available resources in the farming palm oil commodity in Nagan Raya and Aceh Tamiang Aceh Province is not optimal according to the results of research. This is partly proved by optimization models constraint function I (Farmers Overall) to maximize resources so as to generate greater profit of Rp 326.24 million rather than business profits earned today.

Profit Optimization with Constraint Function II (Individual Farmers)

In view of this, farmers are seen as objects of observation of each individual business. The function of the constraints is limited by the value of the average and maximum values observed for each variable. Therefore, the profit function model optimization result is a recommended model for each individual farmer to obtain maximum profit by optimizing resource that may be used.

Just like the model in the function of the first obstacle, the value of the coefficient derived from the estimated regression models were discussed in the previous section. Line as profit function model with constraint function I (Farmers Overall), variable land area, number of plants, capital, fertilizers, medicine, and labor is recommended to be used entirely to maximize profits. Unless sufficient work experience suggested seven years, although some farmers have experienced more of it to 19 years.

Table 4. Results Profit Optimization Functions with Function Constraints II (Individual Farmers)

VARIABLES	SOLUTION		C0EFFICIENTS
land (Z1)	23		3.845.079,387
plant (Z2)	3.300		57.482,944
capital (Z3)	90.000.000		0,611
fertilizer (Z4)	25.500.000		4,190
medicine (Z5)	2.700.000		9,203
labor (Z6)	12		4.378.648,073
experience (Z7)	7		6.066.729,942
land cost (W1)	1.929.114		-15,157
plant cost (W2)	19.225		-1.607,097
capital cost (W3)	2.432.607		-0,148
fertilizer cost (W4)	9.055		-14,130

medicine cost (W5)	807		-1.883,327
labor cost (W6)	1.824.417		-6,044
experience cost (W7)	67.200.000		1,317
		VALUES	**532.686.299**

Source: Data Processing Results

For variable rates also did not differ suggested, which is to use the value suggested terkecil.Namun prices experience using the largest value (Rp. 67.2 million), because this variable has a positive impact on profit. Through the combination with long experience suggested quite 7 years, and use all the resources input and with a minimum price, the obtained maximum profit of Rp 532.69 million. Compare this with the average profit palm oil growers are only less than Rp 175 million.

Thus, the hypothesis that the use of available resources in the farming palm oil commodity in Nagan Raya and Aceh Tamiang Aceh Province have not been proven optimal. The reason is that farmers should be able to obtain a person's resources as suggested in the profit function models function constraints II. If every farmer can make optimal use of resources with, then each farmer can maximize the profit as described above.

5. Conclusions and Recommendations

Variable number of plants, capital, fertilizer, labor, and experience, as well as the cost of land, cost of plant, and the cost of the experience influence the profits of palm oil farmers with a confidence level above 95%. While cost of land and cost of labor real confidence level of 90% only. While variable medicine, the cost of capital, the cost of fertilizer, and the cost of medicines having an effect partially no significant effect on profitability of the oil palm. All of these variables are able to explain the variations that occur and give effect to the palm oil profit 98.2 per cent, 1.8 percent more influenced by other variables not included in the model. Function optimization model with constraints I (Farmers Overall) showed that palm oil farming is not optimal, because they should still be able to maximize profits is greater (Rp 326.24 million) than the profit earned at this time. Function optimization model with constraints II (Individual Farmers) shows that palm oil farming is also not optimal, each farmer should still be able to optimize the use of resources input to obtain maximum profit (Rp532.69 million), far from the average profit farmers are currently receiving Rp 175 million. Experience is a unique variable that plays a major role in the optimization of farming palm oil. Suggested work experience is 7 years with optimal price is the maximum in order to maximize profit. Profit function models that have so far not entered the variable of experience as a factor that determines the value of production, and proven experience esimasi regression model variables significantly influence profit palm oil.

Some suggestions based on the results of research are resources used in farm commodities palm oil is not optimal, especially the authority land by large plantation companies and the excessive production will result in the declining price of commodities produced, for the management of the production of palm oil should be noted from the outset that expected to affect the market. Variable experience is an important factor that is found in this study and a positive and significant influence on the profit palm oil farming as more and more experience, the higher the

skill and ability of palm oil farmers in managing palm oil farming. As a consequence, the higher the experience, higher price issued an experience of farmers. Therefore, the government should seek to provide training to farmers palm of the people to increase their skills so the cost of farmers to improve their skills or expertise in the management of farming palm oil can be cheaper and more efficient so that in a short time a farmer palm oil can optimize his efforts to obtain maximum profit. By looking at the sensitivity analysis, palm oil farmers need to carefully consider the factors influence profit, which includes land, number of plants, capital, fertilizer, medicine, labor, experience of smallholders (including the cost). The last variable is the most importance variable to contribute the amount of profit, which is the novelty of this research. Failure to use the limited input resources would be fatal to profit. Here, handle directly by the role of government is needed, especially to intervene in matters which are difficult to reach farmers, for example, the addition of business land, subsidized seeds and fertilizers, as well as improvement to farmers capability to manage agricultural resources more optimally through agriculture extension or improvement of experienced partner.

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