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ANALYSIS OF FACTORS INFLUENCING THE CONVERSION OF PADDY FIELDS (Oryza sativa) TO OIL PALM (Elaeis gueneensis Jacq) IN PADANG LAWAS REGENCY

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ABSTRACT

Agriculture consists of various subsectors, including food crops and plantation crops, which differ in management systems and impacts. In recent years, the conversion of paddy fields into oil palm plantations has increased in several regions of Indonesia, indicating a shift from food-oriented agriculture to plantation-based agriculture that affects environmental conditions and rural livelihoods.This study aims to analyze the factors influencing the conversion of paddy fields into oil palm plantations in Central Barumun District, Padang Lawas Regency, and to compare paddy farmers' income before and after land conversion. The study employed an interview-based survey of 27 farmers, with primary and secondary data analyzed using descriptive quantitative and qualitative methods. The results indicate that oil palm farm income significantly influences land conversion, while farmers' age and farming experience do not. The average income increased from IDR 1,215,325 per hectare per month before conversion to IDR 1,690,852 per hectare per month after conversion

INTRODUCTION

The state of Indonesia is an agrarian country, which means that the agricultural sector is more dominant and plays an important role in the nation's economy. Vast agricultural land and abundant natural resources are the greatest gift for us Indonesians. In addition, the agricultural sector is also a support in maintaining the country's food security. According to the Central Statistics Agency (BPS, 2023), from 2018 to 2022 the proportion of rice field land

conversion in Indonesia is 10% or an area of 1,025,262.44 ha. The highest land conversion occurred in 2019 with a proportion of 7% with a land area that changed functions, which was 700,047.29 hectares. This decrease in rice harvest area also results in a decrease in rice production every year.

Table 1. Proportion of Paddy Field Land Conversion in Padang Lawas Regency, 2017–2022

Year	Paddy Field Land (Ha)	Proportion (%)
2017	11,307.00	0.00
2018	10,502.00	7.00
2019	9,636.00	8.00
2020	9,636.00	0.00
2021	5,423.00	44.00
2022	5,423.00	0.00
Total	5,884.00	59.00

Source: Department of Agriculture and Fisherie of North Sumatra 2023

Based on the data, the proportion of paddy field land conversion in Padang Lawas Regency during 2017–2022 reached 59%, with a total decline in paddy field area of 5,884 hectares. The most significant decrease occurred in 2021, accounting for 44% of the total conversion, equivalent to a reduction of 4,213 hectares compared to the previous year. This conversion is mainly driven by economic considerations, particularly the shift from paddy farming to oil palm plantations, which are perceived to provide higher and more stable income for farmers. As a result, many paddy fields have been converted into plantation land, leading to a reduction in harvested area and rice production. Similar findings were reported by Pingkan et al. (2015), who stated that declining profitability in food crop farming encourages farmers to shift their land use toward more economically attractive agricultural activities, including plantation crops.

Based on the problems and data presented, this research will focus on two objectives, namely to determine the factors that influence the conversion of agricultural land from rice to oil palm and to determine how much farmer income there is after carrying out land conversion.

RESEARCH METHODS

This research was conducted in Central Barumun District, Padang Lawas Regency, North Sumatra Province. The determination of this research area is carried out purposively or intentionallyThe data have been obtained from official records of the Department of Agriculture and Fisheries of North Sumatra Province (2017–2022) and are presented in Table 1.. The research will be carried out in October-November 2023. The research method contains the time and

location of the research, the materials and tools of the research design, the variables observed, and the analysis method used. The method of determining the research sample was by the Purposive sampling method.

According to Sugiyono (2018, p. 138) purposive sampling is sampling using certain considerations in accordance with the desired criteria to be able to determine the number of samples to be studied. The criteria for farmers to be used as samples are as follows:

1. The farmers who were used as samples were farmers who converted land from rice fields to oil palm with the criteria of land area of 0.5-1 ha.
2. Oil palm land that was previously converted from rice fields is already in the TM (producing crops) period, with the criteria of plant age of 5-10 years.

Based on these criteria, data on farmers who converted paddy fields into oil palm plantations over the past 5–10 years were obtained and classified into 12 farmer groups across 11 villages in Central Barumun District. The total population consisted of 263 farmers. According to Arikunto (2012, p. 104), if the population is fewer than 100 individuals, all members are taken as samples, whereas if the population exceeds 100 individuals, 10–15% or 20–25% of the population may be selected. Therefore, 10% of the population was taken as the sample, resulting in 27 farmers. The land size owned by farmers varied among farmer groups; however, this variation was not used as a criterion for sample selection, as the study focused on land conversion behavior rather than differences in farm size.

Method of Collecting Data

To collect data in this this research, several technique were uses primary and secondary data types. The data collection methods are; interviews, observations, questionnaires adn documents.

Data Analysis Method

The data analysis method is part of the analysis process where the primary or secondary data collected is then processed to produce conclusions in decision-making. In this study, two analysis methods were used, namely the descriptive analysis method and the quantitative analysis method. The descriptive analysis method is used for the purpose of providing explanations and interpretations of data and information in data tabulation. Quantitative analysis method using multiple linear regression equations.

A. Multiple Linear Regression Analysis

The equation of the multiple linear regression model to find out the factors that affect the conversion of paddy fields to oil palm land is as follows:

$$Y = \alpha + b1\ X1 + b2\ X2 + b3X3 + \varepsilon$$

Where:

Y = Conversion of Paddy Fields to Oil Palm Plantations (ha/year)

α = intercept
bi = Regression Coefficient
X1 = Age (years)
X2 = Revenue from oil palm farming (Rp/Month/ha)
X3 = Farming Experience
ε = error

B. Farmers Income Analysis

Revenue is the total result obtained in one production period. Production revenue is obtained from the sale of its output. Mathematically, farming receipts can be written as follows:

$$TR = Y. Py$$

Where:
TR = Revenue (Rp/Month/ha)
Y = Amount of production (Kg/Month/ha)
Py = Product price (Rp/Kg)

Production Cost

Production costs or also called total costs are the total costs incurred during farming. Production costs are divided into two, namely fixed costs and variable costs. Mathematically, the total cost of agricultural production can be written as follows:

$$TC = FC + VC$$

Where:
TC = total cost (Rp/Month/ha)
FC = Fixed cost (Rp)
VC = Variable cost (Rp/Month/ha)

Income Analysis

Income is residual income and profit after taking all costs, expenses and allowances for depreciation and losses that may arise. Net income is the difference between total revenue and total explicit costs incurred during one production period (Saputra et al., 2015). Mathematically, farming income can be written as follows:

$$\pi = TR - TC$$

Information:
π = Income (Rp)
TR = Total Revenue (Rp/Month/ha)
TC = Total Cost (Rp/Month/ha)

RESULTS AND DISCUSSION

A. Multiple Regression Analysis

Using this equation to build an estimate, the regression equation is a mathematical equation that defines the relationship between two variables. This data analysis aims to determine the factors that affect the conversion of rice fields to oil palm in Barumun Tengah District, Padang Lawas Regency.

Table 2. Results of the Multiple Linear Test of Function Transfer

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(*Constant*)	0,413	0,123		3,355	0,003
Age	0,003	0,002	-0,498	1,295	0,208
Palm Oil Revenue	9,904E-8	0,000	0,329	1,711	0,001
Farming Experience	0,001	0,002	0,238	0,615	0,544

Note: Dependent Variable: Land Conversition

Based on the results of the Multiple Linear Regression analysis, the possible equations are as follows.

Y = 0.413 + 0.003 X1 + 9.904 X2 + 0.001 X3

Information:
And = Land Use Transfer (Ha)
X1 = Age (Years)
X2 = Palm Oil Revenue (Rp/ha)
X3 = Farming Experience (Years)

Simultaneous Test

The Simultaneous Test (F Test) statistics basically show the effect of independent variables together on dependent variables. The results of the calculation of the F Test can be seen in the following table 3.

Table 3. Results of the F Test of Function Transfer

ANOVA

Model		Sum Squared	Df	Square Average	F	Sign.
1	Regression	0,011	3	0,004	1,690	0.000 b
	Remnant	0,050	23	0,002		
	Entire	0,061	26			

a. *Dependent Variable*: Land Conversition
b. *Predictors*: (*Constant*), Farming Experience, Oil Palm Receipt, Age

The H0 test criteria are rejected or H1 is accepted, if the value of the significance level of Fcal <α = 0.05 is also proven by if the value of Fcal > Ftable. If the significance value of Fcal is below α = 0.05 and Fcal > Ftable, then the independent variables in this study together affect the dependent variables. From the results of the function transfer F test, it was obtained that the Fcal > Ftabel was at the level of 95% (11.869 > 3.422) and the significant value of F was (0.000). The value obtained is less than the tolerable error probability, which is α 5% or 0.05. This shows that H0 is rejected and H1 is accepted, namely Age (X1), Acceptance X2, Farming experience X3, together or simultaneously have a real effect on the conversion of rice fields to oil palm.

Partial Test

The testing process was carried out by looking at the partial test table by paying attention to the significance column and the calculated T by comparing with the significance level of α = 0.05 and also comparing the T value of the table with the calculated T.

1. The Age variable (X1) did not have a significant effect on the variable Y. It was known that the T value of the table in this assessment for the degree of freedom df=n-k=27-3=24 with a significant value of 5% was 1.711. This is shown in the results of the table the coefficient obtained t-count for the age variable (X1) of 0.003 is smaller than the T table which is 1.711. If the T calculation is smaller than the T of the table, then H0 is accepted and H1 is rejected meaning that the Age variable (X1) has no effect on the Function Transfer variable (Y). Likewise, when viewed from the significance value of the Age variable (X1) 0.205 > 0.05. If the significance is greater than 0.05, then H0 is accepted and H1 is rejected. This means that the age variable (X1) has no effect on the transfer of function (Y).
2. The Income variable (X2) has a significant effect on the Function Transfer variable (Y). This is shown in the results of the table of coefficients obtained T calculation for the Acceptance variable (X2) of 9.904 greater than the T table which is 1.711. If the calculated T is greater than the T of the table, then H0 is rejected and H1 is accepted, meaning that the Revenue variable (X2) has an effect on the Land Function Transfer variable (Y). For the significance value of Revenue (X2) of 0.001 < 0.05. If the significant value < 0.05, then H0 is rejected and H1 is accepted, meaning that the Acceptance variable (X2) has an effect on the Conversion variable (Y).
3. The Farming Experience variable (X3) has an effect on the Switching Function variable (Y). This is shown in the results of the table of coefficients obtained t-count for the Farming Experience variable (X3) of 0.001 greater than the t-table which is 1.711. If the t-count is greater than the t-table, then H0 is accepted and H1 is rejected meaning that Farming Experience (X3) has no effect on Function Transfer (Y). For the significant value of Farming Experience (X3) of 0.544 > 0.05. If the significant value is greater than 0.05 then H0 is accepted and H1 is

rejected, meaning that Farming Experience (X3) has no effect on Switching of Functions (Y).

Coefficient of Determination

The determinant coefficient (R2) is essentially used to measure how far the model is able to explain the variation of its dependent variables. The value of the determinant coefficient is close to one, the correlation is strong, meaning that independent variables can predict the dependent variable strongly. The results of the calculation of the determination coefficient can be seen in the following table 4.

Table 4. Coefficient of Determination (R^2)

Model	R	R square	Customized R Square	Forecast errors
1	0.702	0,710	0,782	765,297

Note: a. Predictors: (Constant), Palm Oil Revenue (X2), Age (X1), Farming Experience (X3)

The determination coefficient measures the level of accuracy/fit (goodness of fit) is the percentage of X's contribution to the variation (fluctuation) Y. If the R2 obtained is close to 1, it can be said that the stronger the model explains the relationship of the free variable to the bound variable. Conversely, if R2 is closer to 0, then the weaker the influence of the independent variable on the bound variable.From the determinant coefficient table (R^2), a value of 0.730 was obtained, which means that together these factors affect the transfer of functions by 71%. While the remaining 29% is explained by other factors outside the variable.

B. Farmers Income Analysis

The revenue of farmers who change land use from paddy fields to oil palm land in Barumun Tengah District, Padang Lawas Regency can be seen in the following Table 5.

Table 5. Average Farmers' Revenue for Land Use Transfer

Commodities	Average Production of GKP/FFB (Kg/Month/ha)	Average Production Price of GKP/FFB (Rp/Kg)	Farmer Revenue (Rp/Month/ha)
Rice	517	3.400	1.757.548
Palm	944	2.100	1.983.333

Source: Primary Data Processed, 2024

Based on Table 5, it shows that the average amount of dry grain production, rice harvest and also oil palm fresh fruit bunches. The average dry grain harvested from paddy fields is obtained per planting season (3 months),

after conversion per month, the average production of dry rice is 517 Kg/month/ha with the selling price of dry grain harvested at Rp.3,400/Kg. Meanwhile, the income of oil palm farmers is obtained every harvest rotation, in one month the average oil palm harvest rotation is twice. Therefore, the average production of fresh fruit bunches of oil palm is 944 Kg/Month/ha with the selling price of FFB which is Rp. 2,100/Kg. Monthly revenue of oil palm land obtained by farmers is Rp. 1,983,333/Month/Ha. The revenue is obtained from the result of multiplying the amount of production by the production price.

Production Cost

In a farming there are production costs, production costs are the total costs incurred during the farming period. Production costs consist of *fixed costs,* variable costs and total costs . Production costs can be seen in Table 6.

Table 6. Avergae Production Costs of Farmers Switching Land Use

Description	Average Fixed Cost (Rp/mo/ha)	Average Variable Cost (Rp/Month/Ha)	Total Cost (Rp/mo/Ha)
Paddy	166.735	375.488	542.223
Palm	150.481	142.000	291.481

Source: Primary Data Processed, 2024

The table shows a breakdown of the average fixed costs, variable costs and total costs in rice fields and oil palm. The average fixed cost in rice farming is obtained from the average cost of harvesting labor and the depreciation of farming tools, which is converted per month, which is Rp. 166,735/month/ha. Shrinkage of farming tools consists of machetes, sickles, knapsacks, and hoes. Meanwhile, the average variable cost is obtained from the average cost of fertilizer and pesticide costs incurred during the rice planting season which is then converted per month, which is Rp.375,488/month/ha. So the total cost is Rp.542,223/month/Ha.

Then for oil palm farming, the average fixed cost is obtained from the average cost of labor and depreciation of farming equipment consisting of dodos, ganch, and angkon (thrusters) which are converted per month, which is Rp.150,481/Month/Ha. As for the average variable cost, it is obtained from the average cost of fertilizer and pesticide costs incurred every 6 months which is then converted per month, which is Rp.142,000/Month/Ha. So the total cost is Rp.291,481/Month/Ha.

Income Analysis

Income is obtained from the difference between receipts and total costs. The income of farmers who convert land from rice fields to oil palm land in Barumun Tengah District, Padang Lawas Regency while the land is still planted

with rice and after it is converted to oil palm land can be seen in the following Table 7.

Table 7. Average Income of Farmers Converting Land Use

Description	Average Revenue (Rp/mo/ha)	Average Total Cost (Rp/mo/ha)	Farmer income (Rp/Month/ha)
Paddy	1.757.548	542.223	1.215.325
Palm Oil	1.983.333	292.481	1.690.852

Source: Primary Data processed, 2024

The table shows that the average income received by farmers during rice fields is Rp. 1,215,325/Month/ha. Meanwhile, the average income of farmers after converting their land into oil palm is Rp. 1,690,852 months/ha. The results and discussions are combined into a whole unit. The data presented in the research results, both in the form of tables and figures, do not need to be described, but must be interpreted. The discussion of the results of the research and testing obtained is presented in the form of theoretical descriptions, both quantitative and qualitative. The results of the experiment should be displayed in the form of graphs or tables. For charts can follow the format for diagrams and figures.

CONCLUSIONS AND POLICY IMPLICATIONS

Conclusions

Palm oil income and farming experience are factors that influence farmers' land conversion decisions. Age, on the other hand, is a variable that does not influence farmers' decision to convert rice fields to oil palm plantations. The average income from oil palm farming is higher than that from rice, at IDR 1,690,852 for oil palm and IDR 1,215,325 for rice.

Suggestion

1. For the government to immediately carry out a mapping of protected rice fields as intended in Presidential Regulation No. 59 of 2019, so that farmers understand and understand and implement the content of the regulation on the control of rice field land conversion.
2. For rice fields that are not included in the map of protected rice fields, the government must also support the use of land to become oil palm, seeing the huge potential of the old field area for oil palm production to prosper farmers.

3. Guaranteeing the rights of farmers included in the map of protected rice fields as referred to in the Presidential Regulation in the form of providing incentives for protected rice fields.
4. For farmers whose rice fields are included in the protected rice field map, they are not allowed to convert their rice fields to non-rice fields unless they get a recommendation from the Minister of ATR as intended in Presidential Regulation No. 59 of 2019, in order to support national food security

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