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Factors Causing the Change of Sustainable Food Agricultural Land to Non-Agricultural in Ogan Ilir Regency

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ABSTRACT

Rapid urbanization and infrastructure development, notably the Trans-Sumatra Toll Road, have intensified the conversion of sustainable food agricultural land (LP2B) to non-agricultural uses in Pemouthan sub-district, Ogan Ilir Regency, threatening regional food security. This study analyzes the interplay of economic, technical, and policy factors driving LP2B changes and evaluates their relative impacts. Quantitative methods were employed, including cluster sampling (92 farmers), high-resolution satellite imagery (2020–2025), and path analysis to model causal relationships. Economic factors (low income, high land value) were most influential (34%), followed by technical (irrigation, machinery; 19.8%) and policy factors (toll roads, spatial planning; 17.5%). Statistical tests (t-test, F-test) and a high determination coefficient (R^2=93.6%) confirmed these variables' significance. The study calls for targeted policies to enhance farmers' income, improve agricultural infrastructure, and enforce spatial regulations. Future research should explore socio-cultural dynamics and climate adaptation strategies to bolster land preservation.

Keywords: sustainable food agricultural land, economic, technical and policy factors, path analysis.

INTRODUCTION

Limited accessibility and increasing population growth rates have resulted in an increasing population explosion in urban areas, resulting in urban growth spreading into rural areas (Triwanda & Santoso, 2022; Ugai et al., 2022). Continuous expansion without planning control can lead to irregular and random development patterns. The limited availability of land makes it difficult to keep pace with the increasingly rapid growth, therefore it is necessary to regulate the development of suburban areas in a planned manner (Nurdin & Hartono, 2023; Purbiyanti et al., 2015).

Food land has a very important meaning in efforts to maintain food security, but with the times, population growth, and the economic demands of the existence of food land begin to be disturbed (Arviansyah et al., 2021). One of the problems that is quite serious today related to food land is the rampant conversion of food land functions to other uses (Lestari et al., 2023; Riswani et al., 2021). The change in the use of agricultural land to non-agricultural has occurred in many places in Indonesia, the two dominant factors that contribute to the conversion of agricultural land are housing development and toll roads (Harpudiansyah & Apriyanti, 2025).

The rapid development of urban areas has caused complex problems, impacting the decline of agricultural land and open land will be converted into built-up land (Rahimi, 2016). One of the areas affected by sustainable food agricultural land into physical buildings such as houses, roads, and industries is Ogan Ilir Regency. In order to minimize the impact, it is necessary to focus on sustainable use so that it can provide benefits both directly and indirectly to the economy, social and environment (Gunadi, 2025).

Ogan Ilir Regency, which is a satellite city of the capital city of South Sumatra Province and is located in the metropolitan urban area, the Palembang Betung Indralaya Kayuagung statue area functions as an urban buffer zone. The area that is most affected by this phenomenon is Pemouthan District with a function as an alternative area for settlement activities (Tandi et al., 2025). It was strengthened again by the existence of the Palembang – Lampung Trans

Sumatra Toll Road in 2021 and the Palembang – Bengkulu Toll Road in 2023 in Pemouthan District causing the rapid and irregular growth of built-up areas in the suburbs of Ogan Ilir Regency.

As a result of the rapid change in land use, many sustainable food agricultural land has been transformed into houses, roads and industries in the Pemouthan sub-district. Based on the Ogan Ilir Regency Regional Spatial Plan in the balance of spatial pattern changes, in 2012 the area of agricultural land was 179,290 hectares, and in 2023 the area of agricultural land was 102,761 hectares, so there has been a decrease in the area of agricultural land by 77 hectares for 10 years (RTRW of Ogan Ilir Regency, 2023).

The Ogan Ilir Regency Long-Term Development Plan from 2005 to 2025 shows that the highest harvest area in 2018 was 38,896.17 hectares. With unstable conditions, the production of sustainable food agricultural land in Ogan Ilir Regency was the highest in 2018 at 185,090 tons. The results of the calculation show that the ability of food carrying capacity in Ogan Ilir Regency is still able to meet. Even so, it is still necessary to control the transfer of land use so that food-producing land does not decline (RPJPD, 2025).

Based on these conditions, the formulation of the problem in this study is what variables cause changes in sustainable food agricultural land in Ogan Ilir Regency (Yuliantina, Mulyana, Wildayana, & Lionardo, 2024; Yuliantina, Mulyana, Wildayana, Lionardo, et al., 2024). Meanwhile, the purpose of the study is to analyze the factors that cause changes in sustainable food agricultural land in Ogan Ilir Regency (Riswani et al., 2023; Yulasteriyani et al., 2021). This study advances existing research by integrating economic, technical, and policy factors into a single quantitative model to analyze sustainable food agricultural land (LP2B) conversion in Pemouthan sub-district, Ogan Ilir Regency—a critical buffer zone for Palembang City. Unlike prior studies (Arviansyah et al., 2021; Harpudiansyah & Apriyanti, 2025), which often focus on isolated factors (e.g., urbanization or policy gaps), this research employs path analysis to quantify direct and indirect influences, revealing that economic factors (34% contribution) dominate over technical (19.8%) and policy (17.5%) factors. The use of high-resolution satellite imagery (CSRT) for land change mapping (2020–2025) and cluster sampling of 92 farmers provides localized, empirical rigor absent in broader regional studies (Gunadi, 2025; Rahimi, 2016). Additionally, the study identifies toll road infrastructure (a national strategic project) as a unique accelerator of land conversion, a dimension underexplored in earlier works. The high explanatory power of the model (R^2=93.6%) surpasses previous efforts (Sugiyono, 2018) and underscores the need for integrated policy interventions, bridging gaps in spatial planning enforcement highlighted by Muhajir (2017) and Dani (2017).

METHODOLOGY

The researcher took place in Pemouthan District, Ogan Ilir Regency, the collection of information for this study used the probability method using cluster sampling techniques. The location of the respondents is in Pemouthan District which consists of Ibul Besar I Village, Ibul Besar II Village, Ibul Besar III Village, Harapan Village, Pegayut Village, White Pipa Village, Sungai Buaya Village, so that a total farmer population of 92 people was obtained in Pemouthan District, Ogan Ilir Regency. The location of research on sustainable food agricultural land change in Figure 1.

This study considers the use of quantitative strategies that use information in numerical or measurement form. It takes into account the points to test the theory and efficiently answers the research question by analyzing the relationships between the factors. The information obtained is then processed and analyzed using quantitative methods to test the causal relationship between the factors.

The data analysis process uses multiple regression analysis methods with a path analysis model. The purpose of this analysis is to identify direct, indirect, and overall influences and to test models that correspond to data in the field. The path analysis model used to test the hypothesis is $Y = PYX_1 + PYX2 + PYX_3 + e$.

The independent variables in this study consist of X^1 , namely economic factors consisting of farmers' income, agricultural land prices, and agricultural production costs. The independent variable X^2 is a technical factor consisting of the availability of agricultural irrigation water, agricultural machinery equipment, and agricultural fertilizers. Independent variables X^3 are policy factors consisting of national strategic projects for toll roads, regional spatial planning policies and LP2B regional regulation policies. Meanwhile, the dependent variable Y is the change in sustainable food agricultural land in Pemmouthan District.

RESULTS AND DISCUSSION

Analysis of Agricultural Land Changes

Based on the results of the analysis of changes in sustainable food agricultural land using the interpretation of high-resolution satellite images (CSRT) in 2020 and 2025, it was revealed that there has been a 5% decrease in the area of sustainable food agricultural land over the last 5 years. In 2020 the area of sustainable food agriculture was recorded at 1,012 Ha, since 2021 there has been a decline due to several aspects such as the economic condition of farmers, the availability of alsintan and the availability of fertilizers. By 2025 the area of sustainable food agriculture in Pemouthan sub-district will be 972 ha, this means that there has been a decrease of 52 hectares over the last five years. The decrease in the area of sustainable food agricultural land occurred in each village from 2020 to 2025.

Based on the data, it can be seen that there has been a decrease in the area of Sustainable Food Agricultural Land (LP2B) in all villages observed during the period from 2020 to 2025. Ibul Besar I Village experienced the most significant decrease in sustainable food agricultural land, which was 19 hectares, followed by Harapan Village with a decrease of 17 hectares. Meanwhile, Pegayut and Ibul Besar II Villages showed a decrease of 5 hectares and 4 hectares, respectively. Smaller declines occurred in Ibul Besar III, Pipa Putih, and Sungai Buaya Villages, with a reduction of 2 hectares each.

This decline indicates pressure on agricultural land, which is likely due to land conversion for non-agricultural purposes such as settlement, industry, or infrastructure. If this trend continues without strict controls, it could negatively affect food availability and threaten the safety of local industries in the future. Furthermore, there is a need for appropriate security and supervision of LP2B to ensure the sustainability of the agricultural system and regional food availability.

The largest land changes are in Ibul Besar I, Harapan, and Pegayut Villages, where some LP2B have been converted into residential and industrial areas. In addition, the development of infrastructure such as toll roads (PSN) toll roads that cross the Ibul Besar I and III areas has an impact on reducing the area of sustainable food agricultural land. Meanwhile, the villages of Pipa Putih and Sungai Buaya have also undergone changes albeit on a smaller scale.

This situation shows pressure due to urbanization and regional development that affects the change of sustainable food agricultural land in Pemouthan sub-district. If it is not balanced with a strict land use control policy, then this land conversion will threaten the availability of food land and damage the spatial structure of the region, therefore it needs to be supported by sustainable spatial planning. Changes in sustainable food farming land can be seen in Figure 2.

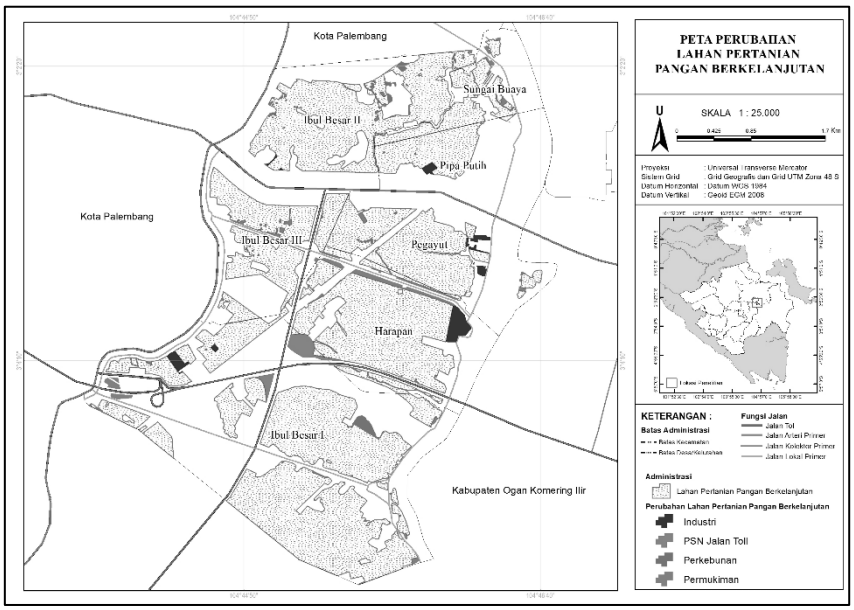

Figure 1. Map of Sustainable Food Agricultural Land Change

Analysis of Factors of Change in Agricultural Land

The analysis of the factors that cause changes in sustainable food agricultural land uses the path analysis method to model the causal relationship between economic factors, technical factors, and government policy factors affecting the area of agricultural land directly or indirectly.

After the data collection is carried out through the distribution of questionnaires in the field, then a validity test is carried out to ensure the extent to which the proposed measuring tool is able to measure the expected concepts or variables accurately and absolutely. A good instrument will produce data that corresponds to reality and can be trusted as a basis for decision-making.

In the validity test which consists of economic components in the form of farmers' income, production costs and land selling prices, technical variables consist of the availability of irrigation water, the availability of agricultural equipment and machinery, and the availability of fertilizers. Meanwhile, the policy component consists of regulating toll road PSN, regional spatial planning, and sustainable food agricultural land regulation.

The results of the validity test showed that there were 9 indicators from 92 respondents as a valid measurement tool, where the value of the correlation coefficient r was calculated to be greater than the t table. The basis for finding t table is to determine the degree of freedom (df = n-k) = (n=100) – (k=2) is 90 with the r value *of the product moment* is 0.207, the results of the validity test can be seen in Table 2.

Table 1. Results of the Indicator Validity Test

Indicators	r Count	r Table	Recommendations
Economics			
Farmers' Income	0.593	0.207	Valid
Land Prices	0.556	0.207	Valid
Production Costs	0.634	0.207	Valid
Technical			
Availability of irrigation water	0.911	0.207	Valid
Availability of tools and machines	0.910	0.207	Valid
Fertilizer Availability	0.891	0.207	Valid

Table 1. Results of the Indicator Validity Test

Indicators	r Count	r Table	Recommendations
Policy			
Toll Road PSN Policy	0.471	0.207	Valid
RTRW Policy	0.660	0.207	Valid
LP2B Regional Regulation Policy	0.655	0.207	Valid

Source: Data processing, 2025

Based on the table above, economic conditions show the r-value calculated above from the r-value of the table, thus all three are proven to be accurate and meet the requirements to be used in measuring economic factors in this study. The technical aspect as a whole shows a very high value of validity, which reflects that technical indicators have a strong and significant contribution in measuring technical variables. The PSN policy aspect of toll roads is lower than other indicators, but the value is still accurate and can be used in policy analysis.

Next, a reliability test is carried out to evaluate the consistency or reliability of an instrument or measuring instrument in providing the same or similar measurement results if it is carried out repeatedly on the same subject or object. The data reliability test in the study which included three variables showed that the instrument used was recognized as a reliable measuring instrument with a value that exceeded the specified standard, namely the Cronbach Alpha value > 0.60 as in the results of the reliability test Table 3.

Table 2. Reliability Test Results

Variable	Alpha Value	*Cronbach Alpha*	Information
Economics	0.804	0.600	Reliable
Technical	0.889	0.600	Reliable
Policy	0.623	0.600	Reliable

Source: Data processing, 2025

All measurement instruments in this study were declared reliable, this shows that each variable has a stable indicator and can be used to test information with confidence. Based on the results of consistent validity and quality checks, the indicators in this study are proven to be significant and reliable. Furthermore, this research can be declared eligible for use in the process of data collection and further analysis.

Independent Variable Correlation Analysis

Correlation analysis is used to measure the relationship between two or more variables to determine the direction and strength of the relationship. In this study, correlation analysis aims to determine the extent of the relationship between indicators in economic, technical and policy aspects to the variables of sustainable food agricultural land change that are studied as a whole.

The correlation coefficient used in this analysis is *Pearson Product Moment,* used to measure the strength of the linear relationship between two quantitative variables with the condition of using interval-scale data and meeting the assumption of normality with the provision of 92 respondents of the N value of table 0.207 as follows*: Pearson Correlation* > N table = related and *Pearson Correlation* < N table = unrelated as in the correlation test results in Table 4.

Table 3. Independent Variable Correlation Results

	Variable	Economics	Technical	Policy
Economics	Pearson Correlation	1	.468**	.273**
	Sig. (2-tailed)		.000	.008
	N	92	92	92
Technical	Pearson Correlation	.468**	1	.595**
	Sig. (2-tailed)	.000		.000
	N	92	92	92
Policy	Pearson Correlation	.273**	.595**	1
	Sig. (2-tailed)	.008	.000	
	N	92	92	92

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Data processing, 2025

Based on the correlation results, it is known that overall the three variables are positively and significantly related to each other, which indicates a relationship between economic, technical and policy aspects in the change of sustainable food agricultural land. The results of observations in the field that there are changes in sustainable food agricultural land due to industrial development and the construction of the national strategic project of the transsumatra toll road which causes agricultural land to be converted into a built area and the low income of farmers to meet their living needs, so that farmers are more interested in converting agricultural land to non-agricultural land which produces higher economic value.

Multiple Linear Regression Analysis

Multiple linear regression analysis is a statistical method used to determine the influence of two or more independent variables on one dependent variable partially and simultaneously. In linear regression analysis, the T test is carried out partially or individually on independent variables against dependent variables.

To determine the feasibility of the regression model whether each economic, technical and policy variable used in this research hypothesis has a significant influence on the transformation of LP2B in Pemouthan District, Ogan Ilir Regency, it is necessary to test with a passive/separate T test with the provisions, namely if H0 = the regression coefficient is not significant, while if Ha = the regression coefficient is significant.

Calculate the T value of the table with the provision α = 0.005 and the degree of freedom (df) = n – k (92-2) = 90 with the value of the T provision of the table which is 1.66196. Whether the result of the table T is accepted or rejected, then it must be seen that if t calculates (T0) < t the table, H0 is accepted and Ha is rejected, and if t calculates (T0) > t table, then H0 is rejected and Ha is accepted as the result of the t test in Table 5.

Table 4. Partial T Test Results

Type		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.596	.355		-1.678	.097
	Economics	.360	.021	.517	16.956	.000
	Technical	.303	.031	.352	9.640	.000
	Policy	.386	.037	.354	10.549	.000

a. Dependent Variable: LP2B Transformation

Source: Data processing, 2025

Based on the table above from the results of the t-test processing, the value t is calculated as the variable > of the t table. The largest value of the factors that affect the change in LP2B is found in the economic variable with a calculated t value of 16.956 > from t table 1.661 with each variable having a sig value of 0.000, it can be concluded that the sig value is 0.000. Therefore, economic, technical, and policy variables individually have an influence on the change of sustainable food agricultural land in Pemouthan District.

Next, the F test was used to decide whether or not there was a joint influence between independent variables on dependent variables in the study. The results of the analysis of the simultaneous f-test in this study are in the anova table which aims to determine the influence of economic variables, technical variables, and policy variables of mutual influence on the change of sustainable food agricultural land in the Pemuluta sub-district of Ogan Ilir Regency as shown in table 6.

Table 6. Simultaneous F Test Results

Type		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	92.895	3	30.965	428.759	.000b
	Residual	6.355	88	.072		
	Total	99.250	91			

a. Dependent Variable: LP2B Transformation

b. Predictors: (Constant), Policy, Economic, Technical

Source: Data processing, 2025

Based on the comparison of the value of F calculated with the F table obtained is 428,759 > F table 2.70 with a significance value of 0.000, it can be said that there is a significant influence on all economic factors including technical and policy factors on the dependent variables of sustainable food agricultural land change. This shows that the regression model used is statistically feasible and is able to explain the relationship thoroughly.

To measure how much the regression model is able to explain the variation of dependent variables caused by independent variables, a determination coefficient test is used. The determination test is shown through the value of R squared (R^2), the higher the value of R^2, the better the model's ability to explain the relationship.

The magnitude of the role of the influence of free variables, including economic, technical and policy conditions on the change in sustainable food agricultural land is 0.936, this can be seen in *the Adjusted R Square* as shown in Table 7.

Table 7. Determination Coefficient Test Results

Type	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.967a	.936	.934	.26874

a. Predictors: (Constant), Policy, Economic, Technical

Source: Data processing, 2025

Based on table 7, the value of the determination coefficient above is close to 1, it can be interpreted that the three variables are free to play a strong role in the change in sustainable food agricultural land in Pemouthan District, Ogan Ilir Regency. The R2 value or R Square guarantee coefficient of 0.936 indicates an influence or economic, technical and policy of 93.6% while the remaining 6.4% may be the influence of other aspects that are not listed in the research.

As seen in the determination interpretation guidelines according to (Sugiyono, 2018) there are 5 values of the determination coefficient interval, namely very weak, low, medium, strong and very strong as in Table 8.

Table 8. Determination Coefficient Test Results

Interval Coefficient	Influence Level
0.00 – 0.119	Very weak
0.20 – 0.399	Low
0.40 – 0.599	Keep
0.60 – 0.799	Strong
0.80 – 1.00	**Very Powerful**

Source: (Sugiyono, 2018)

This classification is useful to assess how well the regression model explains the dependent variables based on the contribution of the independent variables used, if referring to the classification of the value of the determination coefficient in the range of 0.80 – 1.00 which is included in the very strong category (Sugiyono, 2018). This shows that the regression model used has a very high ability to explain the bound variables. In addition, the Adjusted R Square value of 0.934 confirms that the model remains stable and consistent despite adjustments made to the number of predictor variables.

Of the three factors, economic factors are the most dominant factors influencing farmers' decisions in changing agricultural land, especially due to low income, high production costs, and high land selling value. Technological factors such as the availability of irrigation water, the availability of agricultural equipment and machinery, and agricultural fertilizers also affect the intermediate category. Meanwhile, policies such as national strategic projects for toll roads, regional spatial planning policies, and regional regulations for sustainable food agricultural land protection have also contributed to accelerating the change in sustainable food agricultural land.

To find out the direct and indirect influences and also the correlation results between free and bound variables was carried out through a diagram of the path analysis of sustainable food agricultural land change.

Path Analysis

This path analysis model is a development of multiple linear regression analysis techniques using more than one independent variable, namely economic (X1), technical (X2), and policy (X3) with one dependent variable (Y) of sustainable food agricultural land change. Each path is denoted by an arrow indicating the direction of the causal relationship and is accompanied by a path coefficient that illustrates the magnitude of the influence of one variable on another. This analysis also helps identify the direct and indirect effects of the relationship between the variables and the hypothesis test depicted in the path chart.

Based on the coefficient of analysis of the direct influence path of each independent variable on the Y-bound variable, it is shown by the partial regression coefficient, namely PYX1 = 0.517, PYX2 = 0.352 and PYX3 = 0.354 which shows that the economic variable has the greatest direct influence on the change in sustainable food agricultural land. In addition, the relationship between independent variables is also correlated with the values rX1X2 = 0.468, rX1X3 = 0.273 and rX2X3 = 0.595 which shows a positive relationship between independent variables as shown in Figure 3.

Influence of Economic Factors

In this study, the economic factors or economic conditions that affect farmers to convert agricultural land to non-agricultural in the Pemulutan sub-district area are farmers' monthly income, the selling price of agricultural land/hectare and the cost of agricultural production. To determine the magnitude of the direct and indirect influence of independent variables on the dependent variables of sustainable food agricultural land change in Pemuluta sub-district, it is necessary to value the path coefficient and the correlation coefficient.

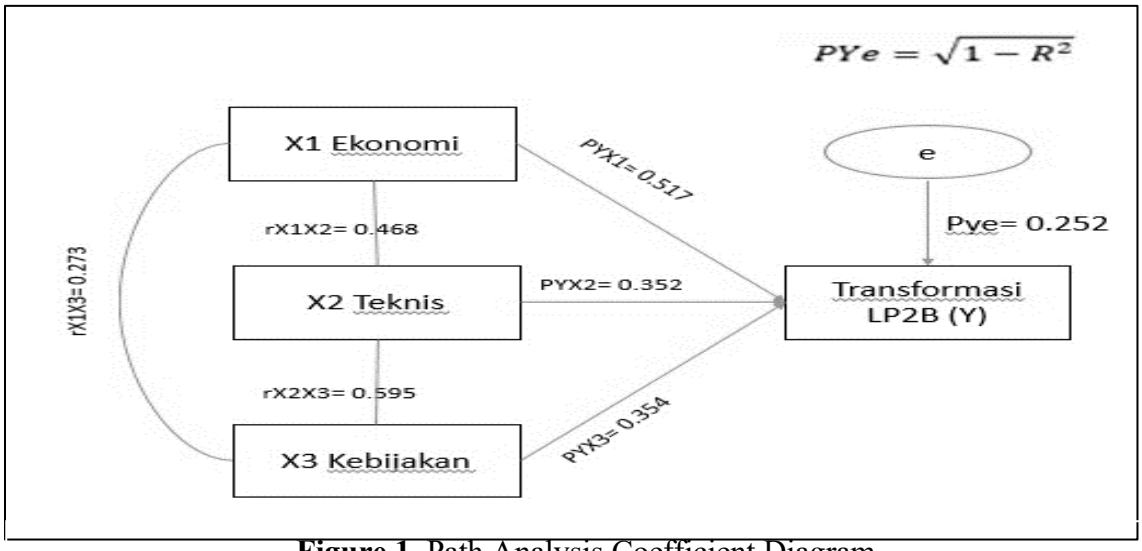

Figure 1. Path Analysis Coefficient Diagram

From the results of data processing for the SPSS 16.0 program, the value of the path coefficient X1 to Y of PYX1 = 0.517 with the correlation coefficient rX1X2 = 0.468 How much influence of economic factors contributes to the change in sustainable food agricultural land can be calculated using the path analysis coefficient. The magnitude of the influence of economic factors of farmers' income, land selling prices, and agricultural production costs (X1) on the transformation of sustainable food farmland (Y) can be calculated by direct influence = $(PYX1)^2 = (0.517)^2 = 0.2672$ while the calculation of indirect influence through X2 = (PYX1) (rX1X2) (PYX2) = (0.443) (0.468) (0.352) = 0.0729.

Based on the calculation above, the direct and indirect influences of the total economic factors of farmers' income, land selling prices, and agricultural production costs on the change in sustainable food agricultural land are 0.2672 + 0.0729 = 0.3401. This means that the change in sustainable food agricultural land is determined by the economic factors of farmers, land selling prices, and agricultural production costs is 34%.

Influence of Technical Factors

Based on the results of field observations, it was found that farmers made changes to sustainable food agricultural land due to several technical factors such as the availability of irrigation, the availability of agricultural tools and machinery, and the availability of agricultural fertilizers. From the results of the questionnaire data in the field and processed using the SPSS 16.0 program, the value of the X2 to Y path coefficient of PYX2 = 0.352 with the correlation coefficient rX2X3 = 0.595 was obtained.

The magnitude of the influence of the technical factors of the availability of irrigation, alsintan and agricultural fertilizer (X2) on the change in sustainable food agricultural land (Y) can be calculated by the direct influence = $(PYX2)^2 = (0.352)^2 = 0.1239$ and the indirect influence through X3 = (PYX2) (rX2X3) (PYX3) = (0.352) (0.595) (0.354) = 0.0741. With a positive path coefficient, which means that the more technical factors increase, the greater the change in sustainable food agricultural land.

Based on the calculation above (direct influence and indirect influence), that is, the magnitude of the total influence of technical factors on the change in sustainable food agricultural land is 0.1239 + 0.0741 = 0.1980. This means that the change in sustainable food agricultural land determined by the most important factors of the availability of irrigation, alsintan and agricultural fertilizers is 19.80%.

Influence of Policy Factors

The influence of government policy factors that encourage the change of sustainable food agricultural land in the Pemulutan sub-district area is caused by several policies such as the national strategic project policy for toll roads, regional spatial planning policies and sustainable food agricultural land protection policies. From the results of the questionnaire distribution data in the field and data processing using the SPSS 16.0 program, the value of the X3 to Y path coefficient of PYX3 = 0.354 with the correlation coefficient rX1X3 = 0.273 was obtained.

The magnitude of the influence of policy factors that contribute to the change in sustainable food agricultural land can be calculated using direct and indirect influences. Direct influence = $(PYX3)^2 = (0.354)^2 = 0.1253$ and indirect influence through X3 = (PYX1) (rX1X3) (PYX3) = (0.517) (0.273) (0.354) = 0.0499.

Based on the calculation of direct and indirect influences, the magnitude of the total influence of the policy factors of the national strategic project toll road, regional spatial plan, sustainable food agricultural land protection regulations is 0.1253 + 0.0499 = 0.1752, meaning that the transformation of LP2B determined by the policy factor of the toll road PSN, RTRW, LP2B Regional Regulation is 17.52%.

Compliance in the implementation of sustainable food agricultural land protection has been implemented in Ogan Ilir Regency because the status of sustainable food agricultural land is agricultural land that can only be developed to produce food agriculture. It is strengthened

by the provisions of law number 41 of 2009 concerning the protection of sustainable food agricultural land in article 44 of the land that has been determined to be sustainable food agricultural land is protected and prohibited from being transferred.

CONCLUSION

The study concludes that economic, technical, and policy factors significantly influence sustainable food agricultural land changes in Pemouthan sub-district, with economic factors (low income, high production costs, and land value) being the most dominant, followed by technical factors (irrigation, machinery, fertilizers) and policy interventions (spatial planning, land protection regulations). Statistical tests (t-test, F-test, R^2=93.6%) confirm their strong impact, suggesting a need for targeted policies and infrastructure improvements. Future research should explore socio-cultural influences, policy effectiveness, economic viability of sustainable farming vs. land sales, technological advancements, regional comparisons, and climate change adaptation to enhance sustainable land management strategies. These directions can help address gaps and strengthen resilience in agricultural land preservation.

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