



(RESEARCH ARTICLE)



## Factors affecting farmers' decision in selling rice farmland in Pemulutan Subdistrict, Ogan Ilir Regency, South Sumatra Province, Indonesia

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### Abstract

This study aims to examine the factors that influence farmers to sell their farmland, and what impacts are caused by the land sale. This study was conducted in Pemulutan Subdistrict, Ogan Ilir Regency, South Sumatra. Data obtained from on-site survey were processed through binary logistic regression using SPSS. The impact was presented descriptively based on the interview's results with respondents. The following results were obtained: Factors that significantly influence farmers' decision to sell their land are duration of formal education, distance between land from their residence, presence or absence of pressure, and farming income. The revenue from land sale is mostly used to meet economic needs. The resulting impacts are both positive and negative economic impacts. The social impacts are the livelihood shift from farming sector to non-farming sector and the loss of farmland that will be passed down to children and grandchildren as local people. The ecosystem impact is the emergence of nuisance pests due to homogeneous plant species.

**Keywords:** Farmland sale; Farmers' decision; Impact; Logistic regression

### 1. Introduction

The Indonesian government has launched the food security program as a top priority in agricultural development policy so that it can regain food self-sufficiency, but efforts to achieve both food self-sufficiency and food sufficiency face a problem, namely the deteriorating quality of farmland resources, which threatens agricultural businesses in the future [1]. Data released by [2] revealed that the fixed figure for Indonesia's rice production in 2021 was 31.36 million tons; it decreased by 0.14 million tons or 0.45% from the 2020 production that reached 31.50 million ton. Although Indonesia is already self-sufficient in rice, agricultural land is shrinking, and as a result, rice production has been declining over the past five years. Demand for agricultural products in the future will continue to increase along with population growth, thus the farmland availability must also increase along with the utilization of agricultural technology and innovation. Opening new farmland in various regions is not easy and always requires a large amount of money. [3] conducted study on the correlation between land ownership and poverty in Pakistan. The results of this study showed that significantly, land ownership has a negative relationship with the poverty rate because when the amount of land ownership increases, the poverty rate will decrease.

According to [4], with the increasingly narrow farmland in Indonesia, it is difficult to expect our farmers to produce optimally. If production is not optimal, farmers' welfare will be compromised due to their low income, thus [5] mentioned that land area has a positive effect on farmers' welfare. For reference, study by [6] revealed that although there are several lands that have not yet been converted, it is estimated that around 30–50% of farmland ownership has been shifted from farmers to large capital owners, in this case the companies.

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The change in land ownership from farmers to companies has generated various impacts, namely economic, social, and environmental impacts. In the economic area, there will be a change in ownership status; the former owner farmers turn into tenant farmers, which will affect their income. This is in accordance with the study by [7], which revealed that the order of income acquisition from highest to lowest is owner farmers, tenant farmers, and finally worker farmers.

The emergence of social problems, such as unemployment and loss of inheritance to children and grandchildren also cause a future impact, like a snowball effect that gets bigger as time passes. This may not yet be realized by the local community because there is still job available, namely as worker farmers at company-owned land, but later, if the company has decided to shift everything into a mechanized system, the need for labor will decrease. High land prices also cause farmers to be tempted by the amount of money offered by the company, especially if the farmland is located close to the city or suburban areas.

On-site surveys show that there is a trend of land sale in Pemulutan Subdistrict from farmers to companies, with the prices offered by companies also being very lucrative. In addition, Pemulutan Subdistrict is a rice-producing region that supports South Sumatra Province in achieving food self-sufficiency. Therefore, a study is needed to examine what factors influence farmers in selling their land and what impacts are caused by the land sale.

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## 2. Material and methods

This study was conducted in Pemulutan Subdistrict, Ogan Ilir Regency, South Sumatra Province. Data were collected from an on-site survey using the multistage random sampling method from 25 villages in the Pemulutan Subdistrict, then four villages were selected that had more farmers selling land than the other villages, namely Pelabuhan Dalam Village, Muara Baru Village, Palu Village, and Harapan Village. Then, using the slovin formula, the number of samples taken was determined, resulting in 98 respondents, consisting of 49 respondents who decided to keep the farmland and 49 respondents who decided to sell the farmland. The data were processed and reported using tabulation, were analyzed through logistic regression using SPSS program, then were described quantitatively and qualitatively. Farmers' decisions to sell the land or not to sell the land are the binary outcomes or variables that are qualitative in nature.

In this study, factors that influence farmers' decisions included age, duration of formal education, number of family members, farming experience, area of land owned, distance of land from farmers' residence, land typology, presence or absence of pressure, farming costs, and farmers' income. The logit model equation is presented as follows:

$$Y = [\ln = \frac{P_i}{(1-P_i)}] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + u$$

Description:

Y = Farmer's decision to sell their land

$\frac{P_i}{(1 - P_i)}$  = Odds (ratio), namely the ratio of the probability of selling land to the probability of not selling land (0 = not selling land; 1 = selling land)

X1 = Farmer's age (years)

X2 = Duration of formal education (years)

X3 = Number of family members (person)

X4 = Farming experience (years)

X5 = Area of land owned (ha)

X6 = Distance between land and farmers' residence (km)

X7 = Land typology (0 = other; 1 = deep lowlands)

X8 = Presence or absence of pressure (0 = none; 1 = pressure)

X9 = Farming costs (IDR/year)

X10 = Farming income (IDR/year)

ui = error

### 2.1. Testing the Feasibility of the Regression Model (Goodness of Fit Test)

The feasibility test of the regression model was assessed using Hosmer and Lemeshow's as measured by the chi square value. This model is to test the null hypothesis that whether the empirical data is in accordance with the model. The hypothesis is as follows:

- If the significance value is <5%, then  $H_0$  is rejected, meaning that the independent variables can significantly influence farmers' decisions in selling or maintaining their land, from these results it can be shown that the goodness of fit test of the model is acceptable.
- If the significance value is > 5%, then  $H_0$  is accepted, meaning that the independent variable has no significant effect on farmers' decisions in selling or maintaining their land, from these results it can be shown that the goodness of fit model test is unacceptable.

## 2.2. Coefficient of Determination (Nagelkerke R Square)

The coefficient of determination in logistic regression is seen from Nagelkerke R Square. The Nagelkerke R Square value close to zero indicates that the ability of the variables to explain the dependent variable is very limited, while the Nagelkarke R Square value close to one indicates that the independent variable is able to provide all the information needed to predict the variability of the dependent variable.

## 2.3. Uji Wald

The hypothesis is tested by comparing the significance value (p-value) with the significance level ( $\alpha$ ). The significance level ( $\alpha$ ) used is 0.05 (5%).

## 2.4. Farmers' income

To calculate the economic impact of farmers who sell their land and do not sell their land, it is calculated using the income formula:  $Pb = Tr - Tc$

Information:

$Pb$  = Net income of rice farming (Rp/ha/year)

$Tr$  = Revenue of rice farming (Rp/ha/year)

$Tc$  = Cost of rice farming products (Rp/ha/year)

## 3. Results and discussion

### 3.1. Factors influencing the farmers' decision in selling the farmland

Based on the results of SPSS calculations, the following values were obtained:

**Table 1** Calculated values for factors influencing farmers' decision to sell their farmland

Parameters	Value
-2 log likelihood	45.42
Omnibus Tests of Model Coefficients	0.00
Nagelkerke R Square	0.80
Hosmer and Lemeshow test	0.30

Source: SPSS data processing (2023)

The -2 log likelihood value is 135.85. This value is greater than the chi square table value of 120.98. This shows that the model, before being entered into variable x, still has not met the test requirements. In the interaction story block 1 table, the -2 log likelihood value is 45.42. This value is smaller than the chi square table value of 113.14. This shows that the model, after being entered into variable x, has met the test requirements or FIT. The next test was the Omnibus Tests of Model Coefficients. The value obtained is 0.00, meaning it is smaller than the significant value of 0.05. This shows that the 10 independent variables simultaneously or jointly affect the farmer's decision to sell or keep their farmland. In the Model Summary table, the Nagelkerke R Square value obtained is 0.803, meaning that the contribution of the influence of the independent variables on the dependent variable together or simultaneously is 80.3%, while the remaining 19.7% is explained by the other variables outside the model. In the Hosmer and Lemeshow test, the significance value obtained is 0.303, which is greater than 0.05. This shows that there is no significant difference between the selected independent variables. Then based on the variable in the equation table, if the significance value is less than 0.05, then it means the variable has a partial or separate effect. The values of all variables studied are presented in Table 2.

**Table 2** Factors influencing farmers' decision to sell or keep their farmland

Variables	Coef B	S. E.	Wald	P-value	Exp(B)
Farmer's age (years) (X1)	-0.066	0.068	0.936	0.333	0.936
Duration of education (years) (X2)	-1.131	0.327	11.949	0.001*	0.323
Number of family members (person) (X3)	-0.528	0.329	2.576	0.109	0.590
Farming experience (years) (X4)	0.011	0.086	0.017	0.897	1.011
Size of land owned (ha) (X5)	3.912	2.543	2.367	0.124	50.005
Distance between land and farmers' residence (km) (X6)	1.286	0.461	7.782	0.005*	3.617
Land typology (X7)	-0.003	0.924	0.000	0.997	0.997
Presence/absence of pressure (X8)	1.868	0.905	4.255	0.039*	6.472
Farming cost (IDR/year) (X9)	0.000	0.000	0.926	0.336	1.000
Farming income (IDR/year) (X10)	0.000	0.000	5.278	0.022*	1.000
Constant	10.977	4.576	5.755	0.016	58540.163

Source: SPSS data processing (2023); Information: \* = Significant at  $\alpha$  0.05

The results of the binary logistic regression analysis show that the variables of years of education, distance between land and farmers' residence, presence or absence of pressure to sell, and farming income generate a p-value that smaller than the error level of 0.05, meaning these are significant factors that affect the farmers' decision to sell their land. Meanwhile, based on the research of [8], the factors that influence farmers to sell their land are Low-yield lands and youth emigration increased.

### 3.1.1. Duration of formal education

Formal education background possessed by farmers allows them to not only focus on farming activities. In addition, farmers with higher formal education are considered more able to absorb new information conveyed by agricultural extension workers in order to more optimally conduct farming activities and produce yields. Farmers who possess higher formal education background can be more skilled in operating technology and machinery. The results of the binary logistic regression analysis of the farmer's duration of education show that the duration of formal education variable generates a p-value of 0.001 at the 0.05 error level, meaning that the variable has a significant effect on the farmers' decision to sell their farmland. The value of the odd ratio or Exp(B) shows a value of 0.323, meaning that every additional year of farmers' education will reduce the chances of 0.323 times for the farmers' decision to sell their land. This result indicates that the higher the formal education background possessed by farmers, the higher the possibility for them to keep their farmland.

### 3.1.2. Distance between farmland and farmers' residence

The results of binary logistic regression analysis on the variable of distance between land and farmer's residence showed that this variable has a p-value of 0.005 at the error rate of 0.05, meaning that this variable has a significant effect on the farmer's decision to sell their farmland, while the odd ratio value or Exp(B) showed a value of 3.617, meaning that every additional 1 km of distance between farmland and farmers' residence will increase the chance of 3.617 times for the farmers' decision to sell their land. This result indicates that the more distant the land owned by farmers from their residence, the higher the possibility for them to sell the farmland.

### 3.1.3. The presence or absence of pressure received by farmers

Based on the calculation of the estimated value of the coefficient of the logit function, the regression coefficient value obtained for the variable of the presence or absence of pressure received by farmers to sell their land is 0.039, with a positive relationship with the farmer's decision to sell their land. The Exp(B) value of 6.472 on this variable indicates that farmers who receive direct pressure to sell their land have a 6.472 greater chance of selling their land than farmers who do not receive pressure. Direct pressure usually involves someone's interference that makes farmers willing to sell their farmland. Indirect pressure is usually related to the farming activities itself. The examples of indirect pressure are the farmland location that no longer has entrance access, making it difficult for farmers to move and transport farming

yields, and problems with the irrigation system, which will be explained further in the sub-section on the economic impact of farmland sale.

#### 3.1.4. Farming income

The next significant variable is the farming income. Logit regression analysis has resulted in a variable value of 0.022, meaning that the farming income per land area significantly affects farmers' decisions to sell their farmland. The regression coefficient value of the farming income variable is 0.000, meaning that the amount of increase or decrease in farming income will not affect farmer's decision to sell or keep their farmland.

### 3.2. The impacts of farmers' decision to sell their farmland

#### 3.2.1. Economic impact

The process of selling farmland economically also has both positive and negative impacts on the community. The positive impact is that in a short period of time, there has been an increase in the supply and circulation of money in the villages. In addition, to encouraging the development of economic facilities and infrastructure, such as shops, food stalls, workshops, etc., these land transactions also increase people's purchasing power and consumption. In addition, the money from land sale will boost an increasing demand for goods and services to the villages, both for primary and secondary needs [6]. Primary needs include the increasing demand for foodstuffs, clothing, and improving the quality of community's settlement so that it becomes more decent. Secondary needs include the education and health needs of family members, the fulfillment of celebrations, and increased mobility of the village's community. These impacts are not only felt directly by respondents who sell their land, but also indirectly by the surrounding community. Several examples are the increase in the number of repair shops and "Pertamini" (fuel sales kiosks), the development of transportation or travel services, the increase in the number of kiosks or stalls for daily necessities, and there are even franchised minimarkets in the village. According to research [9] found that 85.27% of the farmers who sold their land were included in the marginal farmer category and 14.73% were small farmers and none were included in the semi-medium, medium and large categories. The farmland sale has a direct impact on farmers' poverty levels. The revenues from the land sale are used to meet consumption and household needs, not as working capital for the next farming season, thereby leaving farmers susceptible to be unemployed. Analysis on 98 respondents revealed that the income of farmers who did not sell their land was greater than the income of farmers who sold their land. This is because farmers who kept their land averagely have two sources of income, namely from farming sector and from non-farming sector. They also do not need to incur more money to rent the land because they own the land.

If we separate non-farming income from farming income, we can see that the livelihoods of respondents, whether they kept their land or sold it, are highly dependent on their non-farming income. Yields from farming can only be enjoyed once a year, whereas life must continue and daily needs must be met. Thus, if farmers rely solely on farming income, their standard of living is susceptible to fall below the poverty line. Data on farmers' average income is presented in Table 3.

**Table 3** Average income of respondents in Pemulutan Subdistrict

	<b>Average income from rice farming (IDR/month)</b>	<b>Average total income of respondents (IDR/month)</b>
Farmers who did not sell their land	2,303,485	3,734,823
Farmers who sold their land	1,089,558	1,723,641

Source: Processed data based on questionnaire (2023)

The average income from rice farming for farmers who did not sell their land is greater than the average income from rice farming for farmers who sold their land. This is the main driver for farmers to sell their land. If we compare the total income of respondents, namely the current income from farming sector plus the income from non-farming sector, the results show that the average income of respondents who kept their land is also greater than the average income of respondents who sold their land. Several respondents who sold their land decided to continue to conduct farming even though it was operated through a rental system, and their status were shifted to worker farmers. The reason why they continue to cultivate their land is because they will use it to meet their daily food needs. There are also several farmers who sell their yields, but the income they earn will be smaller than that of farmers who own their own land. This is in line with the study by [7], which stated that the income of owner farmers and tenant farmers is greater than the income of tenant farmers and worker farmers.

The interviews revealed that farming activities as the livelihood is not entirely reliable as their main source of income. This is in line with study by [10], which revealed that the income of farmers who only grow rice is smaller than other systems that cultivate more than one crop commodities, thus farmers still have to look for other livelihoods besides farming to meet household needs. Based on the calculation results, one phenomenon was encountered, namely that the income of farmers nowadays is greater than the income when farmers were still cultivating their farmland. Currently, their livelihood is no longer as farmers, but instead as breeders, traders, motorcycle taxi drivers, fishermen, and even due to aging, no longer able to earn income. This is in line with the results of study [11], which stated that after the land is sold, farmers will focus more on finding another jobs and no longer incur additional costs for farming activities, so that the income obtained from their new livelihood is only used for to meet their household needs so that it is enable them to improve their economy.

### *3.2.2. Socio-cultural Impact*

Negatively, the social and cultural impact of farmland sale by farmers is the loss of farmers' main livelihood, which can lead to unemployment, and ultimately trigger social problems, such as criminalization. Generally, the majority of traditional farming communities in rural areas do not possess adequate formal educational backgrounds, and farming knowledge was only acquired through previous experiences and their parents. In addition, they do not possess skills other than farming, making them unprepared to enter non-farming sector employment after losing their farmland. According to on-site data, 45.91% of farmers who sold their land had completed primary school, 30.61% had completed junior high school, and the rest had graduated beyond the junior high school degree.

The land sold to the company is still designated as rice farming land, unlike most cases where rice farmland is converted to non-farmland or plantation land. Farmers are still farmers even though they have changed their status from owner farmers to tenant farmers. In this case, farmers think they can still make a living by becoming workers on the company's land, but they are actually complacent about this condition. If we think in the short term, this may be a solution to their economic problems, but in the long term, becoming a worker in the company does not guarantee that the jobs will always be available, considering that the agricultural system adopted by the company is modern farming that applies technology and mechanization. According to [7], different land ownership statuses will theoretically determine the level of farming diversity, which includes different levels of land productivity, income, and expenditure. Differences in land ownership status will determine farmers' access to capital and affect the production factors used and directly impact farmers' income, which in turn can impact farmers' welfare. Changes in land ownership status also change the structure of economic activities of the surrounding population, from owner farmers to tenant farmers or worker farmers, and even from farmers to non-farmers.

Another social impact is that the land sale leaves the children and grandchildren of local people without a land inheritance. Gradually, they will be removed from their own birthplace. Farming can no longer be used as a livelihood, and automatically makes children and grandchildren will leave the village to find a better livelihood. This will lead to social jealousy because over time, the local population will become a minority and the migrants will be the ones who dominate the businesses.

On the other hand, although according to [12] which states that, social facilities, i.e., educational institutions, banking, hospitals, recreational facilities, and social costs, i.e., pollution and health concerns have no significant impact on farmers' satisfaction. Different from that in Pemulutan Subdistrict, farmland sale also generates positive impacts for several parties, including improving the standard of living of rural communities. Revenues from land sale can be used to repair houses and other household components, even for urgent needs, such as medical treatment. According to [13], the development of industrial and residential areas in an area of land conversion will facilitate an easy accessibility in the area, thus stimulating increased land demand for industry and housing, both by investors and land speculators, which will ultimately lead to an increase in land prices. Likewise, in Pemulutan Subdistrict, the entry of companies into the area has generated an impact on improving the social level of the community, as proven by several local people becoming employees at the company, also by the increase of land prices. These have enabled local residents to be more confident to improve their social status in their community.

### *3.2.3. Environmental Impact*

Basically, in general, the farmland sale to the company does not bring a major ecosystem impact, as the land is still designated as monoculture rice farming. However, this causes an unpleasant impact on the individual farmers who decide not to sell their land, such as the case of pests attacking the farmland of farmers who decided not to sell their land to the company, to the closed water flow system that causes their farmland to be flooded, or dry out instead.

The rice farming system adopted by the company is a monoculture farming system. Study by [14] mentioned that monoculture farming system have several advantages, including ease of production, management, harvesting, and supervision, so that it is enough to focus on one crop commodity and the yields obtained will be maximized. This also seems to be supported by the government, who has launched the food self-sufficiency and national food security program, one of which is the rice farming intensification program that has been promoted since the New Pelita in 1978.

Nonetheless, monoculture systems only focus on one crop commodity for many years. This can cause a negative impact on the farming system, such as the emergence of more pests and diseases as food availability becomes abundant throughout the year. Unfortunately, the local farmers who have little capital are forced to adopt this system. Farmers think that monoculture's marketing is easy and the means of production are readily available, so that they just plant more rice. The monoculture system actually causes local farmers to be highly dependent on artificial pesticides and fertilizers. This can be seen from the interview results, which revealed that all respondent use artificial pesticides and none of them use natural biological enemies to eradicate the pest attacks. Likewise with the use of fertilizers, among 98 respondents, there are only five respondents who use manure as additional nutrients for their farmland.

The practice of rice monoculture system principally requires a lot of water to irrigate rice fields. This is in accordance with [15] study, which stated that rice plant is a very water-intensive commodity because it requires 2,880 liters of water to generate only 1 kg of rice. The company fully aware with this condition, so they build drainage systems for the rice fields they cultivate. The construction of this drainage has caused a negative impact on the surrounding farmland. Several respondents mentioned that they often experience difficulties in obtaining water during the dry season, as well as difficulties in disposing the water excess during high tide. This is because the waterway from the river to their land has been blocked by embankments made by the company, so that the flow of water to their land is hampered, whereas the sufficient amount of water for rice plant greatly affects its productivity. This is in line with study by [16,17], which stated that the water sufficiency for crops will greatly affect the level of yields productivity.

Another problem is the harvesting activities that are not conducted simultaneously. This results in losses for farmers who conduct late harvesting activities. This inequality in harvesting time will later cause patterns of rat infestation, whereas farmers are still very dependent on nature to determine whether the land can be planted or not. Likewise with the problem of other pests, oftentimes, the land purchased by the company is not all directly planted with rice. There are several lands that are just being abandoned or left alone for quite a while so that they are become overgrown by shrubs. These lands may be located next to lands owned by other farmers who decide to continue cultivating their crops. The shrubs become a home for pests because they are neither be taken care of nor be managed. As a result, pests from the shrubs can attack the rice farmland next to or near the shrubs. This can disrupt the yields of farmers who continue to cultivate their crops.

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#### **4. Conclusion**

Based on logical regression results, factors that significantly influence farmers' decision to sell their farmland in Pemulutan Subdistrict, Ogan Ilir Regency are duration of education, distance of land from residence, presence or absence of pressure, and farming income. The economic impact of farmland sale is that the income of farmers who sell their land is reduced due to the loss of one source of income. The average income of farmers who did not sell their land is greater than the income of farmers who sold their land. The social impacts that occur due to land sales are the transition of livelihoods from farming sector to non-farming sector, the loss of inheritance that will be passed down to children and grandchildren as successors, and the transfer of land ownership in the birthplace area of the local population. The environmental impact is the emergence of pests due to plants that are homogeneous. This research is expected to be useful for people who want to sell their land because there is an impact that will arise from this decision.

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#### **Compliance with ethical standards**

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##### *Disclosure of conflict of interest*

The authors declare that there is no conflict of interest.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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