Factors affecting the change of land function from paddy field to housing in North Sinjai District

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Abstract. Along with the increasing population and the development of economic structure, land needs for non-agricultural activities tend to continue to increase. This trend makes the transfer of agricultural land functions difficult to avoid. Land transfer starts from the demand for agricultural commodities, especially food commodities that are less elastic to income compared to the demand for non-agricultural commodities. This study aims to find out the factors that influence the transfer of land functions from rice fields to housing in North Sinjai District. The results showed that during the period studied, namely from December 2017 to January 2018, factors that influenced the transfer of land functions from rice fields to residential land, namely land area, and the location of land partially had a real effect on the transfer of land functions, while the factors of education level, number of dependents, urgent needs and neighbors who converted their land partially had no real effect on the transfer of household land functions of respondents in transfer of land functions from rice fields to housing.

1. Introduction
Land resources are natural resources that are very important for human survival. Land is required in any human activity, such as for agriculture, industrial areas, residential areas, roads for transportation, recreation areas or areas that maintain natural conditions for scientific purposes. Along with the increasing population and the development of economic structure, land needs for non-agricultural activities tend to continue to increase. This trend makes the transfer of agricultural land functions difficult to avoid. Some cases show that if in a location there is a transfer of land functions, then in a short time the surrounding land also switches functions progressively. In line with the development of residential or industrial areas in a land transfer location, the accessibility of the location becomes more conducive to industrial and residential development. Land becomes one of the main elements in supporting human life[1].

Land transfer is the activity of changing land use from an activity that becomes another activity. Land transfer comes as a result of development and population increase. The increase in population and the increasing need for land for development activities have changed the structure of the industry quite rapidly resulting in the controversy of agricultural land in a massive way. In addition to meeting the needs of the industry, the transfer of agricultural land functions also occurs quickly to meet the needs of housing the number is much greater[2].
One of the districts in South Sulawesi, namely Sinjai Regency, is an area with a geographical condition consisting of mountainous land and lowland land which has considerable potential for agricultural land. The main type of food crop being developed is rice. However, the level of development of land area, production levels and productivity of rice is always different every year. These changes are caused by several factors, including crop failure and changes in land use functions from agricultural land to housing. One of the districts in Sinjai Regency that has the largest population is North Sinjai District. With a population density of 1,279 km$^2$.

Along with the development of the capital of Sinjai regency, the development also tends to lead to North Sinjai District. Therefore, the decline of rice fields in North Sinjai Subdistrict is increasing due to land diversion. According to Munir (2008), there are two fundamental factors related to land conversion including the internal factors of farmers and external [3]. Internal factors are the characteristics of farmers that include age, level of education, number of family dependents, land area owned, and level of dependence on land, while external factors include the influence of neighbors, investors, and local government policies in terms of agricultural development. Land use in North Sinjai Kecematan from 2013 to 2017 can be seen in table 1.

**Table 1.** Land use (Ha) in North Sinjai District 2013-2017.

| No  | Land use              | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----|-----------------------|------|------|------|------|------|
| 1.  | Farmland (rice fields)| 740  | 690  | 690  | 680  | 680  |
| 2.  | Dry land              |      |      |      |      |      |
| 3.  | Tegal/garden          | 258  | 258  | 258  | 258  | 258  |
| 4.  | Plantation            | 363  | 363  | 363  | 363  | 363  |
| 5.  | Community forest      | 7    | 7    | 7    | 7    | 7    |
| 6.  | Swamp                 | 847  | 737  | 547  | 547  | 547  |
| 7.  | Pond                  | 337  | 319  | 319  | 319  | 319  |
| 8.  | Settlement            | 396  | 456  | 456  | 466  | 466  |
| 9.  | Others/vacant land    | 9    | 127  | 317  | 317  | 317  |
| Total|                      | 2,957| 2,957| 2,956| 2,957| 2,957|

Source: Central Statistics Agency of Sinjai Regency, 2017.

Land use of North Sinjai District in 2013-2017 for agricultural land (rice fields) from 2013-2017 experienced a decrease in land area of 60 ha while for residential land use from 2013-2017 experienced an increase in land area of 70 ha. This proves that from year to year in North Sinjai Subdistrict experienced a shift in land functions.

The transfer of agricultural land functions to non-agricultural use is caused by several factors. Lestari (2009) argues that the factors that influence the transfer of land functions consist of internal factors, external factors and government policy factors [4]. The narrowing of agricultural land is due to the increasing housing development every year, so it can be said that almost every year agricultural land in North Sinjai District will continue to be narrowed. Based on this, the research aims to find out the factors that influence the transfer of land functions from rice fields to residential land in North Sinjai Kecamatan, Sinjai Regency, South Sulawesi.

**2. Research methods**

The research was conducted from December 2017 to January 2018 in North Sinjai District, Sinjai Regency, South Sulawesi. The selection of this location is done intentionally (Purposive). The selection of this location is based on the consideration that in North Sinjai District, Sinjai Regency, South Sulawesi Province which is the capital of the district has undergone a lot of transfer of agricultural land functions to housing that causes a decrease in agricultural products, especially food crops that result in the availability of food (rice) and the number of farmworkers and farmers who lose their livelihoods due to land transfer.
To find out what factors influence the transfer of land functions from rice fields to residential land in North Sinjai Kecematan, Sinjai Regency, South Sulawesi used qualitative descriptive analysis and Multiple Linear Regression analysis.

2.1. Multiple linear regression analysis
Multiple linear regression analysis methods serve to know the influence or relationship of free variables with bound variables. This study aims to look at the effect of the relationship between independent variables to dependent variables. Dependent variables are variables that are caused or affected by independent variables. The existence of this variable as a variable described in the focus or research topic[5]. In this case, the dependent variable includes land area, education level, number of dependents, urgent needs, location of land and neighbors who converted their land using multiple linear regression methods. The Y value is obtained by the formula:

\[ Y = \beta_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \ldots + b_nX_n + \varepsilon \]  

information:
Y = Land transfer (ha);
X1 = Land area (ha);
X2 = Level of education (years);
X3 = Total Dependent (people);
X4 = Urgent needs (not urgent needs = 0, urgent needs = 1);
X5 = Land location (not suburban = 0, suburb = 1);
X6 = Neighbors who are changing their land (not influence from neighbors = 0, influence from neighbors = 1);
\( \beta_0 \) = intercept;
\( \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \) = partial regression coefficient;
\( \varepsilon \) = Distubance error.

3. Results and discussion

3.1 Factors affecting the change of function of land from paddy fields to housing

Previous research conducted by (Setyoko, 2013) on land transfer in Kopeng Village, Semarang Regency showed that economic factors, social factors, land condition factors, and government regulations influence the process of transfer of agricultural land functions[6].

Factors that influence the transfer of land functions from rice fields to residential land in North Sinjai Kecematan, Sinjai Regency, South Sulawesi, namely internal and external factors. Internal factors consist of land area, education level, number of family dependents, and urgent needs, while external factors consist of land location factors and neighbors who divert land. Factors that affect the transfer of land functions of farmers are arranged in the equation as follows:

\[ Y = -14.425 + 0.610X_1 + 0.793X_2 + 0.169X_3 - 0.520X_4 + 9.870X_5 - 2.777X_6 + \varepsilon \]  

3.2. Testing of equation model of land transfer from rice fields to housing

3.2.1 Determination test \( (R^2) \). A coefficient of determination \( (R^2) \) test is used to measure how far the model can go in explaining variations of dependent variables[7]. To find out the amount of influence of independent variables on dependent variables that is land function transfer \( Y_1 \) is used analysis of coefficient of determination \( (R^2) \). A small or near-zero coefficient of determination \( (R^2) \) means that the ability of independent variables to explain variations of dependent variables is very limited. An \( R^2 \) value approaching one means independent variables provide almost all the information needed to predict dependent variables. By using spss 26, the results of the coefficient of determination \( (R^2) \), t test and F test are obtained as follows:
Table 2. The coefficient of determination of independent variables on tied variables of transfer of function of rice fields in North Sinjai District, Sinjai Regency.

| Model | R   | R square | Adjusted R square | Std. error of the estimate |
|-------|-----|----------|-------------------|---------------------------|
| 1     | .843a | .710     | .641              | 5.549                     |

a. Predictors: (Constant), Neighbors, Education Level, Number of Family Dependents, Urgent Needs, Land Area, Land Location.

Table 2 shows that the result of the coefficient of determination (R²) in the R Square column is 0.710 which means that simultaneously variable land area, education level, number of dependents, urgent needs, location of land and neighbors who divert land, can explain variables over the function of rice fields by 71.0%. While the remaining 29.0% is explained by other variables outside the model. This means that there are other factors of 29.0% that are not covered in this study that are the cause or influence of the transfer of rice field functions by respondents in North Sinjai District, Sinjai Regency.

3.2.2. Model Accuracy Test (F Test).

The F statistic test basically determines whether all the free variables included in the model have a shared influence on bound variables. The F test is used to see the validity of the regression model used. If F \(_{count}\) > F \(_{table}\) then the independent variables that are used in the analysis jointly have a real effect on dependent variables. In this study, F \(_{count}\) is obtained from the results of multiple linear regression. F \(_{table}\) is derived from table F \((k-1, n-k)\) with \(\alpha=0.05\).

Table 3. Test results of the joint effect of independent variables on tied variables of land function change in North Sinjai District, Sinjai Regency.

| Model | Sum of squares | Df | Mean square | F   | Sig. |
|-------|----------------|----|-------------|-----|------|
| 1     | Regression     | 1888.172 | 6 | 314.695 | 10.220 | .000b |
|       | Residual       | 769.797  | 25 | 30.792  |       |      |
|       | Total          | 2657.969 | 31 |         |       |      |

a. Dependent Variable: Land Transfer Rate;
b. Predictors: (Constant), Neighbors, Education Level, Number of Family Dependents, Urgent Needs, Land Area, Land Location.

Table 3 shows that the result of the F test is 10,220. After knowing the calculated F value, the next step is to look for the F value of the table with a significant level of 0.05, then obtained F \(_{table}\) of 2.49. The state of F calculates > F \(_{table}\) \((10.220>2.49)\) which means that the land area, education level, number of family dependents, urgent needs, land location, and neighbors who transfer their land simultaneously (together) affect the transfer of land functions of respondent farmers in North Sinjai District, Sinjai Regency.
3.2.3. Model accuracy test (t test). This test is used to determine if each independent variable individually has a significant influence on dependent variables.

Table 4. Test results of the effect of each independent variable on tied variables of transfer of paddy field function in North Sinjai District, Sinjai Regency.

| Model       | Unstandardized coefficients | Standardized coefficients | T      | Sig.  |
|-------------|------------------------------|---------------------------|--------|-------|
|             | B       | Std. error | Beta   |       |       |
| 1 (Constant)| -14.425 | 8.801      | -1.639 | .114  |
| Land area   | .610    | .088       | .817   | 6.907 | .000  |
| Level of education | .793    | 1.147      | .083   | .692  | .495  |
| Total dependents | .169    | .998       | .020   | .170  | .867  |
| Urgent needs | .520    | 1.413      | .043   | .368  | .716  |
| Land location | 9.870   | 4.792      | .262   | 2.060 | .050  |
| Neighbors   | -2.777  | 2.156      | -.150  | -1.288| .210  |

A. Dependent variable: land transfer rate.

Based on table 4, it can be known the influence of each variable tied to the transfer of land functions as follows:

1) Land area (X1)
The significant value for land area (X1) to land transfer rate (Y) is 0.000 in the Sig column. Significant value is less than the significant level of 0.05 (0.000<0.05) or T calculate for land area (X1) 6.907 > t table 2.060 then the conclusion is not accepted H0, meaning there is a statistically significant relationship between land area to land transfer rate, the amount of land area influence to land transfer rate is 0.610.

2) Level of education (X2)
The significant value for education level (X2) to land transfer rate (Y) is 0.495 in Sig column. Significant value greater than the significant level of 0.05 (0.495>0.05) or T count for the level of education (X2) 0.692< t table 2.060 then the conclusion received H0, meaning there is no statistically significant relationship between the level of education to the level of land transfer, the level of education has no effect on the level of land transfer is 0.793.

The results obtained at the research site, showed the level of education of respondents was relatively high. Of the 32 respondents, 14 were (43.75%) respondents who received education up to the high school level, there were 8 people (25%) respondents who received education to universities, there were 6 people (18.75%) respondents who received education up to junior high school, and there were 4 people (12.50%) respondents who received education up to elementary school. This is in line with Puspasari’s research (2012) which revealed that the high level of education influences decisions in transfer of land functions[8]. If the respondent's education level is low, it does not close the possibility that the respondent will be easily affected by others. The influence can come from neighbors around him who have converted their land or the village officials concerned, on the contrary if the level of education of farmers is high then he can think more rationally in taking the decision to transfer the land he owns.

3) Number of family dependents (X3)
The significant value for the number of family dependents (X3) to the land transfer rate (Y) is 0.867 in the Sig column. A significant value greater than the significant level of 0.05 (0.867>0.05) or T calculates for the number of family dependents (X3) 0.170< t table 2.060 then the conclusion is received H0, meaning that there is no statistically significant relationship between the number of family dependents to the level of land transfer, the number of family dependents has no effect on the level of land transfer is 0.169.
The number of family dependents has no effect on the level of land transfer because with an average number of family dependents as many as 4 people, respondents can meet the needs of their families with the area of land owned. Similarly, Munir (2008) in his research said that land transfer tends to be done by farmers whose dependents are many or more than 4 people. This is because the more daily needs, this will trigger the higher food needs. In this case the number of dependents of the respondent's family is on average as many as 4 people and not more than 4 people.

4) Urgent needs (X4)
The significant value for urgent need (X4) to land transfer rate (Y) is 0.716 in the Sig column. Significant value greater than the significant level of 0.05 (0.716>0.05) or T calculates for the number of family dependents (X4) 0.368 < t table 2.060 then the conclusion received H0, meaning there is no statistically significant relationship between the urgent need for land transfer rate, the urgent need has no effect on the level of land transfer is 0.520.

The significant value for urgent need (X4) to land transfer rate (Y) is 0.716 in the Sig column. Significant value greater than the significant level of 0.05 (0.716>0.05) or T calculates for the number of family dependents (X4) 0.368 < t table 2.060 then the conclusion received H0, meaning there is no statistically significant relationship between the urgent need for land transfer rate, the urgent need has no effect on the level of land transfer is 0.520.

5) Land location (X5)
The significant value for land location (X5) to land transfer rate (Y) is 0.050 in the Sig column. The significant value is less than the significant level of 0.05 (0.050<0.05) or T calculates for land area (X5) 2.060 > t table 2.060 then the conclusion is not accepted H0, meaning there is a statistically significant relationship between the location of land to the level of land transfer, the amount of land location influence on land transfer rate is 9,870.

6) Neighbors who are changing their land (X6)
The significant value for neighbors who switch their land (X6) to land transfer rate (Y) is 0.210 in the Sig column. Significant value greater than significant level 0.05 (0.210>0.05) or T count for neighbors who converted their land (X6) -1.288 < t table 2.060 then the conclusion received H0, meaning that there is no statistically significant relationship between neighbors who transfer their land to the level of land transfer, neighbors who transfer land has no effect on the level of land transfer is -2,777.

The tendency of farmers to divert their land because of the influence of neighbors has a negative relationship and has no effect on the level of land transfer. Farmers cannot be influenced by neighbors by diverting their land. Similarly, Munir's opinion (2008) stated that there is no real connection between the influence of neighbors and the transfer of land functions. This is because the transfer of land is an initiative in itself, but the initiative is carried out after seeing the neighbors who have succeeded.

The conclusion is that based on the results of multiple linear regression analysis only 2 (two) independent variables (land area, and the price of land location) in North Sinjai Subdistrict partially affects the real (with significant rate of 0.00 or < 0.05) to the level of land transfer. While 4 (four) independent variables (education level, number of dependents, urgent needs and neighbors who divert land) in North Sinjai Subdistrict partially have no real effect (with significant level > 0.05) Most household respondents said that the cause of land transfer is due to the location factor of land located in urban suburbs that produces high selling value.

4. Conclusion
The factors that influence the conversion of land from paddy fields to housing land, namely the area of land, and the location of the land partially have a significant effect on land conversion, while the factors of education level, number of dependents, urgent needs and neighbors who partially convert their land have no significant effect. The land function of the respondent's household in changing the function of land from paddy fields to housing.
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