

The Determinant of Farming Land Conversion into Non-Farming Land for Urbanization Development:

A case of Malang regency, East Java

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Abstract—Urbanization processes in many developing countries is unavoidable. This kind of process is associated with the conversion of large areas of agricultural land into non-agricultural uses has been a common trend in those countries, including Indonesia. This trend emerges proliferation of conflicts between maintaining farming land to guarantee food security and urbanization as well as employment opportunities. The demand for conservation of farming land to industrial or residential uses has affected methods of rural people to release their land ownership for urban development. This paper aims to analyze determinant of decision making of rural people in Singosari and Karangploso, Malang regency, to change their land possession to urban people or investors for non-agricultural land purposes. The method of this paper is using an analytical hierarchy process(AHP) approach to identify a main factor of people preference for releasing land ownership from agricultural purposes to other ones. The result of this research showed us that income that has been earned of agricultural sector is less than expected. Another factor is the gotong royong characters in rural area have gone slowly but sure in Singosari sub regency, while wide urban development is in progress.

Keywords—*determinant of farming land conversion; urbanization development; analytical hierarchy process; agricultural income; the gotong royong characters*

I. INTRODUCTION

The conversion of land is a change in land use from agriculture purposes to other functions as an impact of urban development and an increase of population. Demand for land of agriculture for urban development is recognized by almost governments in developing countries cheaper than established urban housing. The changing of land using has created a conflict of interest between maintaining agricultural land for food security and urban development and providing employment [1]. That raises concerns regarding the future of food security, agricultural products, agricultural labor and a reduction in the functioning of the irrigation system. So that the expansion of urban development is a threat to the existence of the agricultural sector.

Changing of land using is basically a natural thing to occur, however, in fact, the conversion can turn into a problem when it targeted productively agricultural land. Smaller and smaller

agricultural land in urban and sub urban which are caused by land conversion have affected the economic, social and environmental aspects of inhabitants. Chan states that some main factors influencing conversion of agricultural are social economic, urban development pressures and government policies [3]. Another factor has considered considered by is land ownership rights system in a country. This system may can accelerate or delay speed of agricultural land conversion. [1]. If the phenomenon of agricultural land conversion to non-agriculture continues into uncontrollable situation, then this will be a threat not only to farmers and the environment, but also it can be a national problem.

A Threats related to the impact of land use change also occurs in Karangploso and Singosari sub-regencies in Malang reegency. A different perspective of landowners on seeing their land status is much influenced by development policies of Batu municipal for development of tourism industry in a massive scale. The tourism development which was begun in 2001 have affected its neighbor areas such as Karangploso and Singosari sub-regencies as buffer zones changing the way of life behavior of landowners in viewing of their property. They are not interested to continue working as productive famers. Rice fields they have been traded with other things that are different in using such as estate houses, newly tourism destination places and shopping centers. The speed of changing of Karangploso and Singosari sub-regencies -districts that are most rapidly experiencing depreciation of their rice fields- is due to easier accessibility to both kota Malang and Kota Batu. Karangploso has lost 60.7 Ha farmland for other using than farming activities in 2013 and increased step by step yearly. This was followed by an increase in the housing area of 1.91%, the development of industrial activities by 0.15%, and the development of trade and service facilities of 0.39% from 2010 to 2013.

Specifically, this paper aims to analyze the factors that influence the transfer of land functions from agriculture to non-agriculture and compare the factors that drive the decision converting land to other functions in Karangploso and Singosari sub-regencies. The focus of the study was devoted to farmers who owned agricultural land converted to urban development goals.

II. REVIEW OF LITERATURE

A. Agricultural Land Conversion and Its Types

Utomo et al. defines land conversion as a transformation of the function of all of the land area from its original ones to other functions while unexpected problems may appear to disturb positively potential land function due to increasing population and urban development needs [3]. Life quality of people in rural areas tend to decrease as impact of land transformation events. Sihalohe has divided land conversion into seven patterns or typologies, including [4]:

1) *Sporadic pattern of land conversion*: This is frequently affected by unproductively land conditions and urgently economic needs.

2) *Systematic conversion*: To increase additional value of unproductive land simultaneously.

3) *Demographic adaption conversion*: Increasingly population growth has converted land to meet house needs.

4) *Social problems driven land conversion*: The conversion of land may emerge economic urgency and welfare changing.

5) *Nothing to lose conversion*: This is caused by the desire to have better living and to move to other cities.

6) *Agrarianism adaptation conversion*: Urgency to enhance agricultural yields and communities' relationship in rural areas.

7) *Multi forms conversion*: This conversion is affected by various factors, especially allocation for public interests such as government offices, public school and trade offices including inheritance system which is not explained in demographic conversion.

Summaryanto in Furi discussed that if a location of agricultural land conversion occurs, the surrounding land will be converted naturally in progress [5]. Some argues that greater land conversion occurs in field rice than dry land because the conversion field rice is being influenced by three factors, firstly, the development of non-agricultural activities such as estate houses, shopping center, offices and industrial areas is installed easier in flatter field rice than in dry lands. Secondly, Well-established infrastructures have been more available in the field rice areas than in dry ones. Thirdly, paddy fields are generally closer to consumer areas or urban areas than dry areas where are usually located in hilly and mountainous areas. Land conversion related to the process of regional development, it can be said that land conversion is a consequence of regional development. Most of the land conversions have indicated an imbalance in land tenure which more dominated by the capitalists who hold license to establish new building.

B. Causative Factors of Land Conversion

The process of transferring agricultural land to non-agricultural use is caused by several factors. Kustiwan in Supriyadi states that there are three important factors that cause the conversion of paddy field functions [6]:

1) *External factors*: caused by the dynamics of urban growth (physical and spatial), demography and economy.

2) *Internal factors*: caused by socio-economic conditions of agricultural households of land users.

3) *Policy factors*: caused by regulatory aspects issued by the central and regional governments that are related to changes in the function of agricultural land.

Pasandaran explains that there are three factors, both alone and together which are determinants of rice field conversion, namely [7]: 1) Scarcity of land and water resources 2) Development dynamics 3) Increased population.

The factors that influence land conversion rice fields are a choice of resource allocation through transactions that are influenced by socio-economic conditions of farmers such as education level, income and overall economic ability as well as land taxes, land prices and land locations. So that control is needed to be in accordance with the Spatial Plan. The following is a description of several factors causing land conversion taken in general from several cases. a. Economic Factors Economically the conversion of land by farmers is either through sales transactions to other parties or replacing non-rice businesses is a rational decision. Because with this decision, farmers expect their total income, both in the short and long term, to increase. Research conducted by several researchers shows that the use of paddy fields for rice cultivation is very inferior to the use for tourism, housing and industry.

Syafa'at suggests that in rice production centers main in Java and Outside Java, shows that in addition to technical and institutional factors, the economic factors that determine the conversion of paddy fields to agriculture and non-agriculture are [8]: (1) the competitive value of rice to other commodities decreases; (2) farmers' responses to market, environmental and power dynamics. Farming competitiveness increases. Conversion of paddy fields to other farms and to settlements can occur without going through a transaction. But the case in Java shows that such conversion cases are far less than those through transactions. This shows that the price of paddy fields greatly affects the conversion of paddy fields [5].

According to Witjaksono there are five social factors that influence the transfer of land functions, namely: behavior change, owner's relationship with land, land solving, decision making, and government appreciation of community aspirations [9]. The last two factors relate to the government system. Assuming the government as a protector and servant of the community, it should be able to act as a controller of land conversion. Therefore, these two factors are not further elaborated in this paper. Transport system

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C. Von Thunen's Location Theory

This theory has developed Ricardo's land rent theory by adding that the location of land can also affect the cost of land rent. In Von Thunen's location theory, the economic surplus of a land is also determined by the location of the economy, namely the distance to the center of the facility and the center of economic growth. The cost of renting land closer to the city center may be more expensive than in the interior because it is linked to its high accessibility to the center of the economy. It is also said that the highest value of land is usually found in trade, industry, settlements, recreation areas, and educational facilities, so that it has the potential to threaten the surrounding land which results in the tendency of land conversion.

III. METHOD

A. Study Areas

This study uses a survey research conducted in Karangploso and Singosari Sub Regency Malang Regency. The data in this study consisted of primary data and secondary data. The selection of respondents was carried out by purposive sampling method. Primary data was obtained from respondents as follow: Chairman of GAPOKTAN (Joint Farmers Group), Chaiman of sub-Gapoktan, PPL officers and Agricultural Observers. The number of the sample in this interview was 20 respondents, composed by 10 respondents in Karangploso and 10 respondents in Singosari. Then, secondary data in this study can be obtained from Karangploso and Singosari sub regencies' offices, the Central Statistics Agency of East Java Province, the Agriculture and Plantation Office of Malang Regency, the Malang District Land Service, as well as other supporting literature such as textbooks, journals, and articles.

B. Analytical Hierarchy Process (AHP) Approach

The data processing in this study used AHP (Analytical Hierarchy Process) s method. The AHP aims to give priority to several alternatives when several preferences or criteria must be considered. Before doing the analysis, the AHP technique designed a hierarchy of problems. The design of the hierarchical structure of the problem in this study is illustrated in figure 1below.

The second step creates a pairwise comparison matrix that describes the relative contribution of the influence of each criterion on each of the criteria objectives. Then it is proceed by calculating the priorities of each variable at level 1 (criteria) namely economic factors, social factors, land conditions, and government regulation factors, by the following steps:

- Make pairwise comparisons of each criterion Thomas L. Saaty proposed a 9-rank scale to compare each ranking in pairs based on its importance as in table 1 below
- The results of the assessment of respondents were averaged using geometric mean to have priority / main factors. Mathematically the mean geometric can be formulated as follows:

$$a_{ij} = (Z_1, Z_2, Z_3, \dots, Z_n) 1 / n$$

Where:

a_{ij} = average comparison value paired criteria a_i with a_j for n participants

Z_i = the comparison value between a_i and a_j for participant i , with $i = 1,2,3, \dots n$

n = number of participants

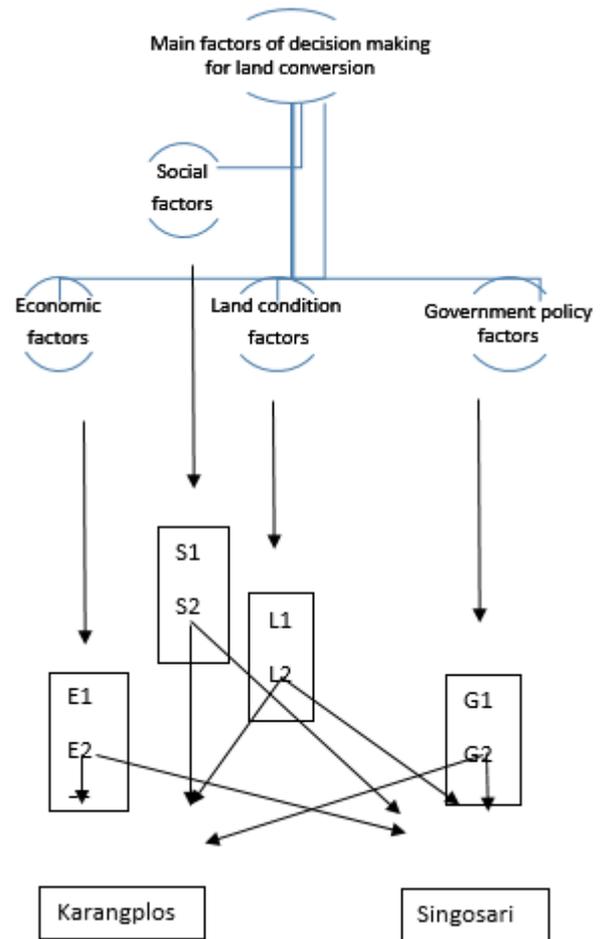


Fig. 1. Design of Hierarchical Structure of Problems.

- The results of each paired comparison are displayed in a pairwise comparison matrix (pairwise comparison) d. Each element is divided in a particular column with the number of columns
- The results are normalized to obtain an eigenvector matrix by calculating the average number of rows in four criteria. The eigenvector is the priority weight of the four criteria for the goal
- Then proceed by calculating the consistency ratio with the following steps:
 - The value of the initial comparison matrix is multiplied by the weight
 - The number of lines multiplied by the weight

- Calculate λ_{max} by summing the multiplication results above divided by n

$$\lambda_{maks} = \frac{\sum VE}{n}$$

- Calculate the consistency index (CI), This is very important to know the consistency of a perception in a decision making. The calculation is as follows:

$$CI = (\lambda_{max} - n) / (n - 1)$$

Where:

CI = consistency index
 λ_{max} = maximum Eigen value
 n = order of the matrix

- Calculate consistency ratio, then, AHP also measures the overall consistency of several considerations through the ratio of consistency with the following calculations:

$$CR = CI / RI$$

Where

CR = Consistency Ratio
 RI = Random Index

If,

CR < 0.1 = the value of pairwise comparison on the matrix of the criteria given is consistent

CR > 0.1 = the value of pairwise comparison on the given criteria matrix is inconsistent. So if it is not consistent, then filling in the values in the paired matrix on the criteria and alternative elements must be repeated.

TABLE I. RELATIVE INTEREST SCALE OF ACTIVITIES INFORMATION

Scale	Notes
1	Equally important things. Two activities have the same contribution to the target
3	An activity has interests slightly and It is stronger than other activities in achieving goals
5	An activity has a stronger interest than other activities in achieving its goals
7	An activity has a very strong interest compared to other activities in achieving the goal
9	An activity has a dominant interest compared to other activities in achieving goals
2,4,6,8	Values are among the values previously mentioned

Source: Saaty [10].

The steps above to calculate the weight / priority of each variable in sub criteria (level 2), then to determine the global priority is done by multiplying the local priority of each sub-criteria with priority criteria. Then, calculate the weight / priority on the alternative (level 3) by comparing the weight of each factor with each sub criteria. After knowing the weight of each factor and sub factor, then the alternative will be determined. The overall value of each factor is the total number of factor weight multiplications with the sub factor weight. So, the alternative to be chosen is the alternative that has the highest value. The variables collected will be tested statistically

using the Microsoft Office Excel program which is a manual calculation and able to provide precise and accurate results in identifying data processing.

IV. DISCUSSION

In this section, we discuss the result of AHP approach to solve this research problem. Based on the recapitulation data of the results of questionnaires to 20 respondents, the results of the analysis are the factors that influence the decision-making of agricultural functions to non-agriculture in the two sub regencies have been obtained.

TABLE II. CRITERIA OF WEIGHT PRIORITY FOR SUB-REGENCY KARANGPLOS

	E	S	L	G	Total	Weight Priorities
E	0,100	0,167	0,063	0,107	0,436	0,109
S	0,100	0,167	0,188	0,179	0,633	0,158
L	0,300	0,167	0,188	0,179	0,833	0,208
G	0,500	0,500	0,563	0,536	2,098	0,525

Source: Primary data

Table 2 describes priority weighting values for each factor in Karangploso. The results above indicate that the main factor influencing decision making over the function of agricultural land to non-agriculture in Karangploso is government regulation, with the highest priority value by 0.525. Then it is followed by land conditions by 0.158, and the last is an economic factor places the lowest value in 0.109. The values of these four factors are consistent, because the results of the analysis show the value of consistency ratio (CR) of -1.019, where the CR requirement is <0.1.

TABLE III. CRITERIA OF WEIGHT PRIORITY FOR SUB-REGENCY SINGOSARI

	E	S	L	G	Total	Weight Priorities
E	0,375	0,375	0,375	0,375	1,500	0,375
S	0,125	0,125	0,125	0,125	0,500	0,125
L	0,125	0,125	0,125	0,125	0,500	0,125
G	0,375	0,375	0,375	0,375	1,500	0,375

Source: Primary data

Based on table 3, we obtain priority weighting values for each criterion in Singosari. The results above indicate that the main factors that influence decision making over the function of agricultural land to non-agriculture in Singosari are economic and government regulation factors, with the same weight priority value by 0.375. Then it is followed by social factors and land condition factors with the same priority weight value of 0.125. The values of these four factors are consistent, because the results of the analysis show the value of consistency ratio (CR) of -1.019, where the CR requirement is <0.1.

TABLE IV. COMPARISON OF WEIGHT PRIORITIES BETWEEN SINGOSARI AND KARANGPLOSO SUB REGENCIES

Criteria	Karangploso	Singosari	Weight Priorities
<i>E</i>	0,227	0,773	0,304
<i>S</i>	0,556	0,444	0,179
<i>L</i>	0,625	0,375	0,129
<i>G</i>	0,588	0,412	0,388
Total	0,477	0,523	

Source: Primary data

Table 4 tells us that the results of AHP calculations showed that Singosari has a higher percentage compared to Karangploso, which is 52.3% compared to 47.7%. This shows that the factors that influence decision-making over the function of agricultural land to non-agriculture in Malang Regency for Singosari are 52.3%, while for Karangploso District is 47.7%. Basically, the difference of 4.6%, means that the two sub-districts together have a great opportunity in the transfer of land functions, and the highest priority weight value remains with the government regulation factor. This is relevant to the existence of government projects that continue to develop in these two sub-districts as an area of development efforts as well as the influence of urban development in City of Malang and Batu. This is because the location of Karangploso and Singosari coincide with the two cities.

V. CONCLUSION AND SUGGESTION

A. Conclusion

Based on the results of research data on the factors that influence decision-making over the function of agricultural land to non-agriculture in Karangploso and Singosari which have been analyzed by Analytical Hierarchy Process (AHP), it can be concluded as follows:

- The factors that influence decision making over the function of agricultural land to non-agriculture in Karangploso and Singosari Malang Regency has covered economic, social, land conditions, and government regulation factors.
- Basically the main cause that influences decision making over the function of agricultural land to non-agriculture in Karangploso is the income received from agricultural. This income is not sufficient for daily needs and the ease of the business licenses by government. In Singosari, due to the low income farmers received and high tax, the tradition of mutual cooperation (*gotong royong*) faded the location of the land which has high accessibility.

B. Suggestion

The suggestions of the empirical result are:

- Malang Regency Government should tighten control over the conversion of agricultural land also clarify the policy because all this time the government policy is still ambiguous. On the one hand, the RTRW of Malang Regency expressly prohibits the conversion of

agricultural land and on the other hand the RTRW of Malang Regency also requires the growth of development in the non-agricultural sector for the sake of a more developed economy.

- The landowner should have a high awareness of the importance of maintaining agricultural land in the suburbs to avoid food insecurity, environmental damage, and the threat of waning local cultures, because to make new rice fields requires a lot of money and a long time.
- Supposedly, the periphery areas that are prone to urban development such as Karangploso and Singosari, where in the development process oriented to urban perspectives, should be protected by conducive legal system
- The recommendation for further research is to observe the base sector in Karangploso and Singosari as an effort to integrate the developing sectors into the region. This is because the stronger the integration, the higher the readiness of an area in facing development so that the results can be used as a reference for the government in policy making, strategy formulation, and project planning such as the Special Economic Zone for Tourism in Singosari. This is right thing to prevent agricultural sectors being sacrificed for other purposes. Then, observing the socio-economic implications of the community in Karangploso and Singosari post land conversion events.

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