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# Factors Affecting Farmers Decisions to Convert Pepper Garden into a Coal Mining Area

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The present study aims to analyse factors that affect a farmers decisions to convert pepper gardens into a coal mining area. This study will also explore the relationship between the characteristic of the respondents residing in Batuah Village in Los Janan, Kutai Kertanegara. This study was conducted over 2 (two) years. T Primary data for this study was obtained through observation and direct interviews with 31 respondents that were performed by giving questions. Secondary data was obtained by reviewing papers and data from related institutions that would support this study. Analysis of farmers perception on shifting the function of their land from pepper gardens to a coalmining area was performed in an ordinal manner using a Likert scale. A Spearman correlation test was used to measure the closeness of the relationship between respondents characteristic in making decisions (to changing the function of the land). Based on the findings, the aspects that dominantly affect the decision of the farmers on converting their pepper garden into a coal mining area can be seen from a technical aspect, socio-cultural, and economic aspect. It was found that a farmer's gender has a close relation with farmer's motivation from a socio-cultural perspective. It also has a close relation with farmer's motivation in the technical aspect. A farmer's age also has a close relationship with the attribute of income structure. The number of farmer's family members had a close relationship with a farmer's intention to developing business and the width of their land. It is only the factor of farmer's education that is insignificantly correlated with socio-cultural, technical, and economic aspects.

**Keywords:** *Land conversion, pepper, coal mining, perception.*

## Introduction

The need for lands that would be able to be used in non-agricultural activities tends to increase along with the escalation of residents and infestation, as well as development of economic structure. This tendency results in the transition of the function of agricultural land that seems to be unavoidable, as, in some cases, an execution of land function change is often followed progressively by other executions of land function change that happen in the surrounding area.

According to Bambang Irawan and SupenoSuprayitno (2001), Xia et al. (2020), de Molina et al. (2020), Tian et al. (2020), Yan et al. (2020), at the macro level, the process of transition of the agricultural land function (land conversion) can be performed by farmers themselves or other parties. Land function change that is executed by other parties has a bigger effect to the reduction of food production capacity. This is because the process of land function change (which is performed by other parties) usually impacts quite a large portion of land, especially when it is performed for contraction of a residential area. There are two stages in the process of land function change that is performed by other parties including: (1) transfer of land ownership between farmer and other party and (ii) utilisation of the land for non-agricultural activities.

Land use change means the addition of land function in one sector that is followed by the reduction of land function in the other sector. In other words, land use change is the change in land function within a particular period,in which is a change of an agricultural land into a non-agricultural land. According to Wahyunto (2001), land use change for the implementation development is inevitable. Land use change will happen due to two conditions, the first is the need to fulfill people's necessity that become greater, the second is the demand for a better quality of life (Briassoulis, 2019; Guo et al., 2019; Newbold et al., 2019; Hasan et al., 2019; Badia et al., 2019; Cocklin, 2019)

According to Ruswandi (2005) land use change from agricultural to non-agricultural brings direct and indirect effects. Some of direct effects that may come from land use change would be the loss of fertile agricultural land, the loss of agricultural infrastructure infestation, damage of the natural landscape, and environmental problems. Meanwhile, the indirect effect would be human overpopulation caused by human migration from urban areas to suburban areas.

Land use change will also bring effect to environment (Houghton, 1994; Searchinger et al., 2008; Bateman, 2009; Feng et al., 2020; Chu, 2020; Chen et al., 2020). The transition from agricultural land to non-agricultural land will affect stability of agricultural land ecosystem. Land use change or land conversion will generate factual consequences which are, among

other things, the lessening of green open space that would disturb the environment of water systems and straighten the land for agricultural cultivation. Land conversion or land use change may change land ownership and land tenure status. Changes in land tenure (that happen in countryside) would affect income and employment opportunities which are considered to be the welfare indicators of countryside society. Restriction in accessing land will generate restriction in utilising the benefit of the land while it is considered to be the main capital or the main livelihood, and such limitation will cause the shift of employment opportunities to non-agricultural sectors (informal sector).

Agricultural lands located in Kutai Kertanegara are also the subject to land change use, especially agricultural land located in Loa Janan, a district that is widely acknowledged as pepper farming center. Loa Janan has always been the pepper producing area in Kutai Kertanegara. The total area of pepper garden in Loa Janan is as much as 4,379 Ha and the total pepper production is as much as 5,285 tons in the form of Dry Seed. However, the number of area and production has slowly declined since 2009 due to the lack of land irrigation or due to land conversion to coal mining area or oil palm and rubber plantation. Land use change into palm oil and rubber plantation is occurring not only in Loa Janan but also in other districts (Plantation Office of the Province of East Kalimantan, 2018).

The occurrence of land use change from pepper garden to coal mining area is caused by the decision of the land owner or the farmer. Things that are intriguing to observe here are the perceptions and motivations as to why farmers were willing to give up their land to be converted into a coal mining area. Therefore, an observation needs to be performed in order to understand the perception in the motivation of the farmers to converse their pepper lands to coal mining area, as well as the relationship between farmer's characteristics and their decision to converse the land.

**Materials and Methods**

This study was conducted in 2 (two) months and it begun with collecting data and ended by processing the data. This study was conducted in Batuah Village, which is located in Loa Janan, Kutai Kertanegara. The location was chosen purposively because Loa Jananisa is the former pepper farming centre which most pepper gardens are now converted into coal mining area. This study used secondary and primary data. Primary data was obtained by directly observing and interviewing respondents using questioners prepared according research objectives.

Secondary data was obtained from reviewing papers and information from related institutions that would support the study. This included: Plantation Statistics from the Plantation Office of the Province of East Kalimantan, Official Branch Office of Batuah Village, local

Extension Agent, Central Bureau of Statistics and other references. This study is in the form or survey and its sample were taken using the method of purposive sampling, which is a designed based on the criteria of pepper farmers that have converted their pepper garden into coal mining area. The population of this study was farmers/planters that have converted pepper garden to coal mining area in Batuah Village, Loa Janan, Kutai Kertanegara. According to information delivered by the plantation officer during the survey, there are 180 farmers who converted pepper gardens into coal mining areas. The researcher took the number of samples based on the formula stated in the above with the level of precision of 15 percent, so that the total sample which was taken was 31 respondents.

**Table1:** Variables and Indicators of the concept of farmer's perception

| **Dimension** | **Variable** | **Indicator** |
|---|---|---|
| Socio-Cultural Aspect | Farmer's Motivation | 1. The need to get a move on from the condition<br>2. The need to enhance household income<br>3. Intention to farm in a more productive area<br>4. Intention to develop business<br>5. Cooperation and kinship of the society |
| | Government's Policy | 1. Local/city establishment<br>2. Agricultural policy<br>3. Residential area |
| Technical Aspect | Labour | 1. Number of labourers in the family performing farming business |
| | Capital | 1. The high cost of production<br>2. Little capital |
| | Land Condition | 1. Irrigation system<br>2. Land area<br>3. Production<br>4. Productivity |
| | Facility and Infrastructure | 1. Technology<br>2. Seed supply, pesticide, fertiliser and other facilities<br>3. Marketing |
| Economic Aspect | Economic Pressure | 1. Ability to fulfill household necessity.<br>2. Income Structure |
| | Job Opportunity | Availability of labour |

Farmer's perception on land use change was measured trough variables and their indicators using ordinal scale which is based on Likert's Summated Rating Scale from 1 to 5 with the following assessment.

**Table 2:** Score for the answer given

| **Approval to the statements** | | **Score** |
|---|---|---|
| 1. Strongly Agree | | 5 |
| 2. Agree | | 4 |
| 3. Neutral | | 3 |
| 4. Disagree | | 2 |
| 5. Strongly Disagree | | 1 |

Analysis of farmer's perception on the idea of converting pepper garden to coal mining idea is relatively observed through dimensions, variables, and indicators of the study. According to the total of the X principal value, the principal scale is grouped into 5 perception categories using the following formula:

**Variable Score :** (Number of question x Scale Score)/Number of question.

**Magnitude of Range:** (Maximum Score – Minimum Score)/ Number of Category.

This study was using questioner comprises 21 items of questions, and the number of respondents was 31. The number of farmer's perceptions that were successfully analysed was 31. The number of questions that were successfully scored was 21 questions, the highest score was 5 and the lowest score was 1, therefore, the magnitude of the calculation was:

Maximum Score= (21 x 5)/21 = 5
Minimum Score = (21 x 1)/21 = 1
Magnitude of Range = ((5-1)/5)-0,01 = 0,79

Based on the range stated above, therefore, the level of farmer's perception on the idea to convert pepper garden to coal mining area was divided into 5, which were:

**Table 3:** Score of farmer's perceptions

| **Category** | **Score** |
|---|---|
| Very High | 4,20 - 5,00 |
| High | 3,40 - 4,19 |
| Moderate | 2,60 - 3,39 |
| Low | 1,80 - 2,59 |
| Very Low | 1,00 - 1,79 |

After the data were served in the table, examinations of the relation between the characteristic of the respondents and the approval of the statements was performed through a Spearman

correlation test. Meanwhile, according to Handiarto (2015), the formula that was used is as follows:

$$rs = (\Sigma X^2 + \Sigma Y^2 - \Sigma di^2)/ 2(\Sigma X^2 \ \Sigma Y^2)^{1/2}$$

**Note:**
*Rs* : Correlation of rank Spearman
*X* : Variable of farmer's characteristic
*Y* : Variable of decision to perform land use change
Calculation of correlation rank spearman analysis was performed with the help of SPSS 23. The next activity was performing analysis using descriptive analysis in order to answer the objective of this study. Descriptive analysis was utilised to display data and information which were obtained from the interview and questioner.

## Results and Discussion

### *Land Use Change*

In this study, land use change means the activity to convert the function of pepper garden into the function of coal mining area. It was found in this study that factors which affect the decision of the farmers to converting pepper garden into coal mining area were social-cultural factor, economic, and technical factor.

### *Socio-Cultural Aspect*

For socio-cultural aspect, we can see that farmers want to leave the condition they have lived so far, to enhance household income, to farm in a more productive area, to develop their business. The farmers have the sense of cooperation and kinship with other people, which were classified into farmer's motivation, as well as the existence of government's policies which are related to local/city establishment, agricultural policy and residential area.

**Table 4:** Variation of Socio-Cultural Aspect of the Respondents

| No | Variable of Socio-Cultural Aspect | Score | Category |
|---|---|---|---|
| 1 | Farmer's Motivation | 4,19 | High |
| | The need to get a move on from condition | 3,70 | High |
| | The need to enhance household income | 4,45 | Very High |
| | Intention to farm in a more productive area | 3,74 | High |
| | Intention to develop business | 4,51 | Very High |
| | Cooperation and kinship of the society | 4,58 | Very High |
| 2 | Government's policy | 3,42 | High |
| | Local/city establishment | 3,48 | High |

| | | | |
|---|---|---|---|
| | Agricultural policy | 4,19 | High |
| | Residential area | 2,61 | Moderate |
| | **The level of Socio-Cultural Aspect** | **3,80** | **High** |

According to the table stated above, we can see that the land use change which happened to the pepper gardens in Loa Janan was caused by farmer's motivation. The other inner factors that determine perception were, among others, motivation and personality. Although, basically, motivation and personality cannot be separated from learning process, both factors affect strongly the process of choosing perception. Motivation plays a very important role in the development of the perception. Someone will be motivated after getting acquainted with an object and will develop a perception. Some of the indicators of farmer's motivation that affect decision-making to converting function of a land is the sense of cooperation and kinship that are quite high between the society and the desire to develop business. Farmer's perception to convert their pepper garden into a mining area that was highly scored in socio-cultural aspect was the sense of cooperation and kinship with the value of 4.45. It was the highest score in the group of socio-cultural aspect, as farmers in Loa Janan have a high social sense, especially when it comes to building cooperation, solidarity and kinship during the process of decision-making to sell their pepper garden to a mining company, that one single farmer who has sold pepper garden would affect other farmers to do the same thing.

The second variable that highly affects farmer's decision to convert pepper garden into coal mining area was the need to enhance household income. Score value for this variable was considered very high (4.45). The farmers have this perception that pepper farming business generates a little income even if compared to selling pepper garden to be converted into coal mining area.

Meanwhile, the lowest score in the group of socio-cultural aspect went to the need to move on from their condition as pepper farmer. The score was 3.70, which was considered 'high', which means that the farmers did not really intend to leave their job as a farmer, and it was just because they would like to show the sense of solidarity between farmers and cooperation with other people. The average score for the group of socio-cultural aspect was 3.80 and the value was considered 'high'.

***Technical Aspect***

There are many obstacles in maintaining and developing farm, one of which is agricultural facility and infrastructure, as in technology, seed supply and market.
Technical aspects that were reviewed in this study include labour availability, capital, land condition (irrigation system, land area, production and productivity) and availability of agricultural facility and infrastructure. According to Table 12, the highest score in the group

of technical aspect went to 'the number of labour in the family performing farming businesses' and the score was 4.48 which was considered 'very high'. The predicament was that the number of labourers who manage the farm was deemed low, that management of farm in Loa Janan was deemed not optimal. However, the number of additional costs and outcome would rise if the farmers were about to hire more labourers because the farmer had to pay for the service.

**Table 5:** Variable Technical Aspect of the Respondent

| No | Variable of Technical Aspect | Score | Category |
|---|---|---|---|
| 1 | Labour | **4,48** | Very High |
| | Number of labourers in the family performing farming business | 4,48 | Very High |
| 2 | Capital | **3,46** | High |
| | High production cost | 3,61 | High |
| | Little capital | 3,32 | Moderate |
| 3 | Land Condition | **3,95** | High |
| | Irrigation system | 4,09 | High |
| | Land Area | 3,90 | High |
| | Production | 3,93 | High |
| | Productivity | 3,90 | High |
| 4 | Facility and Infrastructure | **4,13** | High |
| | Technology | 3,96 | High |
| | Supply of seed, fertiliser and other facilities | 4,09 | High |
| | Marketing | 4,35 | Very High |
| | **Level of Technical Aspect** | **4,00** | High |

Meanwhile, perception that got the lowest score was 'little capital'. The level of farmer's perception on converting pepper garden into coalmining area in the group of technical aspect was considered 'High' with the score of 4.00.

***Economic Aspect***

If agricultural resource is limited, farmer's capability in producing products and services will also be limited. Therefore, farmers are expected to choose as to what kind of plant to produce, how to produce the plant, whom the plant is produced and how to provide the fund. The level of farmer's perception on converting pepper garden into coalmining area in the group of economic aspect was considered 'High' with the score of 3.69.

**Table 6:** Variable Economic Aspect of the Respondent

| No | Variable of Economic Aspect | Score | Category |
|---|---|---|---|
| 1 | Economic Pressure | 4,09 | High |
| | Ability to fulfil household necessity | 4,16 | High |
| | Income structure | 4,03 | High |
| 2 | Job Opportunity | 3,29 | Moderate |
| | Labour availability | 3,29 | Moderate |
| | **Level of Economic Aspect** | **3,69** | **High** |

The highest score in the group of economic aspect went to the factor of the ability to fulfill household necessity (it was 4.16 and was classified into 'high'). Meanwhile, the lowest score goes to 'low labour availability'. This was due to farmer's perception that agricultural sector will not be deemed prospective if agricultural development in Loa Jananget stagnant or declined. Additionally, the farmers intend to have their children working in a non-agricultural sector, specifically the mining sector, that will offer a bigger amount of salary because business in pepper farming contains a fair number of hindrances and obstacles such as a declining production due to errors in cultivation handling, pests and diseases, and also instability of pepper selling price.

The change of agricultural land function into mining area, that is occurred to pepper gardens in Batuah Village, is caused by several factors.

**Table 7:** Factors that Affect Land Use Change from Pepper Garden to Coal Mining Area in Terms of Socio-Cultural, Technical and Economic Aspect

| No | Dimension | Score of Variable | Category |
|---|---|---|---|
| 1 | Socio-Cultural Aspect | 3,80 | High |
| 2 | Technical Aspect | 4,00 | High |
| 3 | Economic Aspect | 3,69 | High |
| | **Total** | **11,49** | |
| | **Average** | **3,83** | High |

According to Table 7, the technical urge, which is related to labouring system, cost of production, capital, land condition and availability of facility, and infrastructure affects farmer's decision to change the use of their land.

Land use change is happening due to the lack of labour needed to maintain the farm. Such a lack of labour would prevent the farm to produce the pepper optimally that the farmers prefer to sell their land to mining companies in the hope that they would be able to start a new business that is more prospective. The sense of cooperation and kinship among the farmers was also the factor that encourages the farmer to change the use of their land.

**Table 8:** Factors that cause land use change

| No | Variable | Score | Category |
|---|---|---|---|
| 1 | Labour | 4,48 | Very High |
| 2 | Farmer's Motivation | 4,19 | High |
| 3 | Facilities and Infrastructure | 4,13 | High |
| 4 | Economic Pressure | 4,09 | High |
| 5 | Land Condition | 3,95 | High |
| 6 | Government's Policy | 3,42 | High |
| 7 | Capital | 3,46 | High |
| 8 | Job Opportunity | 3,29 | Moderate |

Facility and infrastructure, as well as marketing, would also be the factors for the farmers to change the function of their lands. This is because the pepper selling price is always under the term of the middlemen due to farmer's lack of information updates regarding pepper selling price.

***Relation between Farmer's Characteristic and Variable of Farmer's Decision-Making to Performing Land use Change***

The Spearman correlation value that come from analysis on the relationship between characteristics of farmers (gender, age, education level, status, number of family members, land area) and the factors that cause land use change can be seen in the following table:

**Table 9:** Relation between respondent's characteristic and socio-cultural aspect

| | **Farmer's Characteristic** | | | |
|---|---|---|---|---|
| **Decision to Change Land Function** | Gender | Age | Education | Number of Family Member |
| **Socio-Cultural Characteristic** | | | | |
| The need to get a move on from their condition | **0.311*** | 0.111 | 0.024 | 0.121 |
| The need to enhance household necessity | 0.107 | -0.064 | 0.214 | -0.043 |
| Intention to farm in a more productive area | 0.118 | 0.076 | -0.088 | 0.111 |
| Intention to develop business | 0.159 | 0.064 | -0.068 | **0.359*** |
| Cooperation and kinship of the society | 0.017 | 0.195 | -0.012 | 0.273 |
| Local/city establishment | 0.288 | -0.100 | -0.253 | 0.129 |
| Government's Policy | **0.395*** | -0.124 | -0.001 | 0.291 |
| Residential area | 0.183 | -0.141 | 0.153 | -0.055 |

**Note:**

- Insignificantly related
* Significantly related
** Very significantly related

In Socio-Cultural aspect, farmer's gender was significantly related to the attribute of "the need to get a move on from the condition and agricultural policy". Thus, a farmer's gender was positively and significantly related to farmer's decision to convert pepper garden into coal mining area in terms of the need to get a move on from the condition and government's policy, with the score values of 0,311* and 0,395*.

It was intriguing to find that, in the term of socio-cultural aspect, land use change from pepper garden to coal mining area in Loa Janan was caused by agricultural policies issued by the government. The farmers or the respondents at that time informed that government barely help farmers to handle the problem that came from farming pepper, such as pests and disease occurred to the plant. Moreover, the government barely comprehended that post-harvest technology in Loa Janan is certainly lacking. In addition, farmers were often found to be helpless against the selling price of pepper that was continuously declining, while the government was deemed to be undedicated in handling the problem. The farmers in Batuah Village, Kutai Kertanegara, quit their farming business due to those problems. They found that incentive from the government was not beneficial for them to keep planting the peppers.

The number of family members was significantly related to the intention to develop business. Thus, the number of family members was positively and significantly related to farmer's decision to convert pepper garden into coal mining area in terms of the intention to develop business, with the score values of 0.395*. It means that farmer's intention to leave their condition as farmers lead them to sell their pepper garden to mining companies in the hope that they would be able to start a new non-agricultural business to enhance income.
The bigger the number of family members, the higher the possibility of decision to converse land in order to develop business by selling pepper garden to mining companies which money obtained after the selling will be used the capital to build the new business.

**Table 10:** Relation between respondent's characteristic and technical aspect

| | **Farmer's Characteristic** | | | |
|---|---|---|---|---|
| **Decision to Change Land Function** | Gender | Age | Education | Number of Family Member |
| **Technical Aspect** | | | | |
| Number of labourers in the family performing farming business | -0.289 | -0.064 | -0.040 | -0.270 |
| Cost of production | **0.302*** | -0.259 | -0.020 | -0.294 |
| Little capital | **0.369*** | -0.123 | 0.124 | 0.019 |
| Irrigation system | **0.338*** | -0.012 | -0.051 | 0.100 |
| Land Area | **0.315*** | 0.257 | -0.289 | **0.322*** |
| Production | 0.213 | 0.116 | -0.075 | 0.179 |
| Productivity | 0.158 | 0.129 | -0.204 | 0.291 |
| Technology | 0.065 | -0.023 | 0.145 | 0.000 |
| Supply of seed, fertiliser and other facilities | **0.389*** | -0.285 | -0.037 | -0.174 |
| Marketing | 0.267 | -0.191 | -0.075 | 0.000 |

**Note:**

- Insignificantly related
* Significantly related
** Very significantly related

In the Technical Aspect, farmer's gender was significantly related to the attribute of production cost, little capital, irrigation system, land area as well as supply of seed, fertiliser and other facilities with value of 0,302* ,0,369*, 0,338*, 0,315*, 0,389*. Thus, farmer's gender was positively and significantly related to farmer's decision to convert pepper garden into coal mining area in terms of production cost, little capital, irrigation system, land area as well as supply of seed, fertiliser and other facilities.

The characteristic of the number of family member was significantly related to land area with the value of 0.322*. Thus, the number of family member was positively and significantly related to farmer's decision to convert pepper garden into coal mining area in terms of land area, which means that the bigger the number of family member the broader the area of converted land.

Characteristic of land area was significantly related with land area and productivity and the value was 0.314* and 0.301*. Thus, land area was positively and significantly related to farmer's decision to convert pepper garden into coal mining area in terms of land area and

productivity which means that the broader/higher the land area and productivity, the higher the possibility of decision to converse land and to enhance productivity.

**Table 11:** Relation between respondent's characteristic and economic aspect

| | **Farmer's Characteristic** | | | |
|---|---|---|---|---|
| **Decision to Change Land Function** | Gender | Age | Education | Number of Family Member |
| **3. Economic aspect** | | | | |
| Ability to fulfil household necessity | -0.194 | 0.002 | -0.062 | -0.021 |
| Income structure | 0.126 | **-0.315*** | 0.184 | 0.095 |
| Labour availability | 0.211 | 0.063 | 0.186 | -0.024 |

**Note:**

- Insignificantly related
* Significantly related
** Very significantly related

Regarding the economic aspect, a farmer's age was significantly related to the attribute of income structure with value of 0.315*. Thus, farmer's age was negatively and significantly related to farmer's decision to convert pepper garden into coal mining area in terms of income structure, which means that the lower the farmer's age, the lower the possibility of decision to convert pepper garden into coal mining area.

Respondent age refers to the age (in year) of the farmers during the survey. Farmer's age was related to experience and maturity level of the farmers in making a decision. Economic structure was the main reason for the farmers to convert their pepper garden into coal mining area. This study found that 87% of the respondents, which were productive farmers aged 20-55 years and were residing in Batuah Village, considered the structure of household income to be the main factor that affects the decision to perform land use change.

## Conclusions

According to the findings and discussion of this study, it can be concluded that:

1. Factors that were dominantly affect farmer's decision in converting their land (from pepper garden to coal mining area) were the factors grouped in the technical aspect, followed by the factors grouped in the socio-cultural and economic aspect.
2. In socio-cultural aspect, farmer's gender was significantly related to farmer's motivation to sell their land to mining companies with the intention to leave the condition as farmers and agricultural policy were used as the reason. Farmer gender was also significantly

related to the factors grouped in technical aspect, such as cost of production, little capital, irrigation system, land area and supply of seed, fertiliser and other facilities. Farmer's age was related to income structure. Factor of education level was insignificantly related to all the factors grouped in socio-cultural, technical and economic aspect. The number of family member was significantly related with the intention of developing business and land area.

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