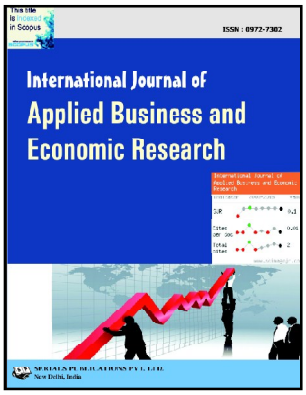

International Journal of Applied Business and Economic Research

ISSN : 0972-7302

available at http: www.serialsjournal.com

Volume 15 • Number 19 • 2017

Factors that Stimulate Farmers to Convert their Farmland

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Abstract: The food security in Indonesia is threatened because the area dedicated to farming is decreasing. The most important area for food production in Indonesia is Java especially the north part of the island. The trans-toll road on Java has been developed in the north of Java, and this road encourages farmers to convert farmland to non-agricultural use because it is more valuable after the road was constructed. This threatens food security in Indonesia. The purpose of this research is to analyze the factors that stimulate farmers to convert their farmland. The research used a survey method in the Terisi district, Indramayu Regency, Indonesia. The results showed that farmers convert their farmland based on income and proximity to the road. This research might prevent farmers from converting their farmland by increasing famer income around the road. This would promote food security in Indonesia.

Key Words: Food security, Land farm convert, Trans-toll Java road

I. INTRODUCTION

Rice is the most important staple food in Indonesia (Bulog, 2015). Rice production in Indonesia is concentrated on Java. This area only 6.5% of Indonesia's area (BPS, 2017), but it produces more than 50% of Indonesian rice (BPS, 2017). The rice production on Java is threatened because of the development of the trans-Java toll road (BPJT, 2016). This development increases the value of land near the toll road and can temp farmers to convert their land. If this continues, rice production could decrease.

The toll road is impacting farmland. In west Java, the road goes through Bekasi, Karawang and Subang regencies. The first trans toll Java is from Jakarta to Cikampek, and it was first operated in 1988 (BPJT, 2016). From 1999-2002 the agricultural land conversion in Java Island is 73.71 thousand hectares;

71.24% of this land conversion was on Java (Sayaka & Tarigan, 2011). There are 1000 ha converted per year (Irawan, 2011). This conversion occurs more frequently near the road. The road facilitated 655,400 Ha of agricultural land to be converted on Java (Sayaka & Tarigan, 2011). Previous research (Chung, 2002) has shown that the toll road has a positive effect on urban areas, but negative effects on agriculture areas. Other work (Mothorpe & Schnier, 2013) showed that the development of the interstate highway system reduced agricultural land in the United States by 19.3%.

In 2016, a second trans-Java toll road was completed (BPJT, 2016). This toll road passes through Subang, Indramayu, Majalengka and Cirebon Regencies. The Indramayu regency is most important area for rice production in west Java. This regency has the largest rice production in west Java (BPS Jabar, 2016). Again, this can reduce rice production, and the government should take steps to preserve food security.

We studied why farmers convert their land. Previous work (Hietela, Waldhardtb, & Otteb, 2007), evaluated the socio economics variables underlying farmland conversion. The most common factors are population density, percentage employment in agriculture, percentage employment in industry sectors, number of farms, number of industries, commuters working outside the district, agricultural land, livestock, production type of farm, time occupied in farms, leasehold land, leasehold rent, inheritance, traffic area size, distance from transport facilities, municipalities with central infrastructural functions, set-aside land programs, and extensification programs.

Azadi (Azadi, *et al.,* 2016) showed that latent variables that drive agricultural land conversion include economics, social, political, and planning, environmental, and technological. The observed variables of economics are agriculture profitability, land prices, farmers' income, agriculture product prices, fluctuation of agriculture prices, marketing of agricultural products, agricultural price inputs, financial support, and agriculture insurance. The social variables include attention to urban and industrial development, life style, interest to agricultural activity, awareness of agricultural land conversion, lack of non-governments organizations (NGO) and community based organization (NBO), education, frequency of contacts with urban populations, migration from rural to urban, facilities in rural area, awareness to agricultural land effect, age, utilization of agricultural land, and farmers' social status.

The variables of politics and planning include urban sprawl, law, coordination among organizations related to agricultural land conversion, awareness of policy makers related to agricultural land conversion, programs for agricultural development, policies and program in agricultural sectors, familiarity to laws of agricultural land conversation, prohibition for agricultural law, professional country division, political bias of agricultural sectors, farmers participation of policy making, systematics approach of policy making, conflicting land conservation, and administration of agricultural land converts. The environmental variables include ground water levels, awareness of sustainable issues, soil degradation, environmental disaster, climate changes, and plant and animal disease. Research on Indonesian agricultural conversion (Harini, Yunus, Kasto, & Hartono, 2012) used internal factors to influence the agricultural land conversion including age, education, number of families, broad land, agriculture activity, farm income, non-farm income, land location, land prices, and long efforts in the agricultural sector.

The first step is selling the farm, and willingness to sell is important (McDonald, Liu, Harold, & Kress, 2001). This is affected by the sale price. Here, we studied land price and size of land this influences

the willingness to sell as shown previously (Azadi, *et al.,* 2016) and (Harini, Yunus, Kasto, & Hartono, 2012). We only studied agricultural land and fertile soil. Parcel size and location are the variables.

Previous work (Guerrero, Knight, Grantham, Cowling, & Wilson, 2010) evaluated the human social factors underlying conversion: demographics, human capital, and social capital. The variable of demographics includes years of ownership, years of farming, primary land use, number of generations, and cultural group. The variables of social capital are conservation knowledge, willing to be involved in a binding conservation agreement, interest in receiving, production activities, entrepreneurship, and burn-out potential. The variables of social capital include local networks, broader networks, membership in local social organizations, and willingness to collaborate.

Azadi (Azadi, *et al.,* 2016) studied land prices, farmer income, education, age, and attention to urban and industrial development. This moved from latent variables to observed variables. Here, the method is direct to the observed variables and is simple. The social attention to urban and industrial development was adjusted to perception of urban life.

Other research (Hietela, Waldhardtb, & Otteb, 2007) used macro data, but we used micro data from the farmers. The variables must be adjusted for this research. The variables chosen and adjusted for this research include percent employment in agriculture adjusted to dependency to agriculture sectors and distance from transport facilities adjusted to road proximity.

Other work (McDonald, Liu, Harold, & Kress, 2001) showed that farmers' willingness to sell the farm includes sociological, economic, and ecological components. The sociological component is the attitude of the landowner to sell his land. The economics component is the sale price. The ecological component includes land cover type, soil type, parcel size, and location. The land cover divided of five categories: (1) urban lands, (2) agricultural lands, (3) grasslands, (4) forested lands, and (5) non-forested land. Soil type is wetland and non-wetland. Parcel size is the number of parcels and their area. Location is how far the location is from the road and the city.

Other variables (Guerrero, Knight, Grantham, Cowling, & Wilson, 2010) have been simplified in this research and grouped as farm group activity. The demographic factors and human social factors are represented in the farm activity group. The core human social factors describe how much interaction the farmer has with social factors involving the community. This is like farm group activity.

Other research (Harini, Yunus, Kasto, & Hartono, 2012) adjusted for this research are age, number of family, agriculture activity, farm income, land location, land prices, and long-term plans for the agricultural sector. Farm income was adjusted to income, and land location was adjusted to proximity to road.

The variable of this research is to mix and simplicity variables uses before the research. The dependent variables are willingness of the farmers to sell/convert the land. The independent variables of this research are non-agricultural profit, land price, income, urban life, activity in farmers' group, proximity to road, number of land parcels, land fertility, age, education, number of family members in workforce, and dependency on agriculture. The main questions are how these variables influence the farmers' willingness to sell or convert the land. The result can guide governments in preserving farmland and hence rice production.

This research is a second research from the main research of "The Food Security Study". The first research was completed in 2016. The research is sponsored of Ministry of Technology Research and High Education of the Republic of Indonesia.

II. RESEARCH METHOD

This worked used a survey that began in July 2017. The regions were Terisi District, Indramayu Regency, Indonesia because the Terisi District has the toll gate from the trans-Java toll road in Indramayu; Indramayu Regency has the highest rice production in West Java Province (BPS Jabar, 2016), and West Java Province has an active toll road already operational in this province (BPJT, 2016).

The source of data is from rice farmers who have own land farm in Terisi District. The number of respondents is 91 who were selected at random. The variables are described in Table 1.

Table 1
Variables

Variables	*Description*	*Scale*
Land farm convert	Willingness or desire the farmers to convert his farmland	Ordinal
Land prices	Price of farmland	
Farmer income	Income from agriculture	Ordinal
Education	Highest level of education	Ordinal
Age	The age of the farmers	Ordinal
Perception of urban life	Perception of farmers about life in the city	Ordinal
Dependency to agriculture sectors	Percentage of income from agriculture	Ordinal
Proximity to road	Distance from land to main road	Ordinal
Farm group activity	Activity in farmers group	Ordinal

The analysis is not parametric because the data is ordinal. The analysis used a rank Spearman treatment because this purpose of this analysis is to know the effect of correlation between variables. The variable has a significant effect if the null hypothesis can be rejected at 95% confidence or á < 0.05. Analysis used SPSS.

III. RESULT

The results are shown in Table 2.

Table 2
The Analysis Results

Variables	*Correlation*	*Significant*
Land prices	0.091	0.196
Farmer income**	-0.266	0.005
Education	-0.113	0.143
Age	0.061	0.284
Perception of urban life	0.148	0.081
Dependency to agriculture sectors	-0.156	0.070
Proximity to road*	0.182	0.042
Farm group activity	0.080	0.226

Note: ** highly significant
* Significant

Table 2 shows that that farmer income and proximity to road has the greatest impact. Farmer income has a negative value suggesting that poor farmers are more likely to convert. Farmers with farmland near the road are more likely to convert their farmland.

IV. DISCUSSION

Farm income and proximity to road are the most important variables. Farmers with less income are more likely to convert their farmland. This is natural because they need money. To prevent land conversion, the government must support farmer income. This will conserve rice paddies on Java despite the new toll road. This program is important to maintain the food security in Indonesia.

The government of the Republic of Indonesia is committed to food security. This commitment is published The Law of No. 41 Year 2009 (BPN, 2009): to protect agricultural land for sustainable food. Article No. 39 declares that the government can be provide incentives in form of budget allocations to protect agricultural land. The incentives can be supported to increasing the income of paddy farmer.

Paddies can be purchased by the government at a higher price than the market price especially for farmers around the trans-Java toll road. Timmer (Timmer, 2002) showed that the farmer needs high prices to stimulate production to maintain the food security in Indonesia. The high prices for paddies can stimulate increased farmer income. This would prevent farmers from converting his farmland to another use.

The high prices of paddies can stimulate high paddy price policy. Previous research (Makbul & Ratnaningtyas, 2017) showed that rice prices scale with paddy prices. This means that the paddy prices can increase if rice prices increase. Thus, paddy policy should be done carefully because it can harm consumers and increase poverty in Indonesia. Peiffer (Peifffer, 2013) showed that increased rice prices can stimulate poverty. The high rice prices are a problem, but government action can maintain food security.

The proximity to the road can stimulate a farmer to convert his farmland to another use. Road development is a dilemma because the road is important to development. The government can use Law No. 41 Year 2009 (BPN, 2009) in article No. 44 that details that agricultural land cannot be converted to non-agricultural use. This can be detailed via farmers group meetings. This promotion can prevent farmers from converting his farmland.

V. CONCLUSION

Rice paddies form the basis of Indonesian food. Paddy production is concentrated on Java. Many small paddies have converted to other uses especially considering the new trans-Java toll road. This road makes the land more valuable for non-agricultural use. Thus, farmers tend to convert his farmland. If this phenomenon continuous, then food security in Indonesia is under threat. Here we show reasons underlying this conversion in Terisi district, Indramayu Regency. We selected this area because Terisi district is an entry to the toll road but also has many paddies.

The results show that farmer income and proximity to the road are the most important factors. The implication of this result is that government must support the program to increase farmer income near the toll road. Another program can promote food security to the farmer near toll road. The programs can be implemented by the farmers groups in that area.

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