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IMPACTS OF DEVELOPMENT OF POPULATION AND CONVERSION OF AGRICULTURAL LAND ON FOOD SECURITY (RICE) IN BALI, INDONESIA

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Abstract

Efforts of agricultural production and development improvement seem to be increasingly difficult and complex since there are not only faced by classical internal problems but also various global issues and increasingly worse environmental changes. High demand on food stock, particularly rice and increasingly number of population are the problems in its achievement. The agricultural conversion function of land for housing and social economic facility is unavoidable mainly in urban area n Bali as one of the provinces also facing land function change. The conversion function of land in Bali is unavoidable in line with the high demand on housing. This research aims to (1) determine the pattern and distribution of population development of Regency / City in Bali; (2) determine the patternland distribution of conversion function of land development of Regency / City in Bali; (3) determine the distribution of paddy (rice) production development of Regency / City in Bali; and (4) analyze the population development and conversion function of land impacts on the paddy (rice) production in Bali province. This research uses secondary data or time series data. The data were obtained from BPS Regency /

City in Bali province for the last five years. The samples in this research are Regencies / Cities in Bali Province. The data analysis method in this research is path analysis. Results of the analysis using common effect method indicate that the development of the number of population and area of conversion function of land or agricultural land influences non significantly on food security, meanwhile, by using fixed effect method, in fact, the development of the number of population influences negatively significant on the area of paddy fields (land function change). The development of the number of population provides negative impacts indirectly on the paddy production / food security in Regencies / Cities in Bali.

Keywords: Pattern and Distribution, Population Development, Conversion Function of Land, Public Administration

INTRODUCTION

The agricultural conversion function of land for the purposes of housing and social economic facility is unavoidable mainly in urban areas, both n Java and outside Java (Rusastra *et al*., 1997). Even, in outside Java, there is a tendency on its increase by the application of regional autonomy which regions are given authority to manage their own areas. Thus, regional governments compete to improve their income (regional income) to build their areas, so that it causes on agricultural land conversion into development facilities, both fertile agricultural land and less productive agricultural land to be used to improve their regional incomes. According to Rusastra and Budhi (1997), in Banjarmasin there are many paddy field conversions in urban and semi-urban areas as a result of housing enlargement. This condition leads to broader conversions. Since the housing development will be followed by the development of economic facility. In the agricultural aspect, it will disrupt the paddy ecosystem in the form of pest attack, lack of lightning, and water system disorder. It means that conversion of land tends to be accelerative (Irawan *et al*., 2000).

Bali is one of the provinces in Indonesia facing the same problem as other regions, namely conversion function of land. The conversion function of land is unavoidable in line with the increasing demand of housing. Investors, both domestic and foreign have reached remote spots of rural areas in Bali. Almost all areas are exploited and productive agricultural lands are cleared for housing and accommodation to support Bali tourism. In another aspect, there is a rapid growth of population mainly urbanization flow (the incoming population from outside Bali) to seek for jobs, also, developing intensity of development mainly in tourism sector as well as various other sectors will cause the increasing demand on lands. This leads to the use of

productive agricultural lands for construction of housing, tourism supporting facility such as hotel, villa, home stay, and others. Then, this will lead to conversion function of agricultural land into non agricultural or industrial lands.

The conversion function of land basically is a natural issue in the current modern era, but the conversion function of land in reality also leads to many problems since it is taken in productive agricultural lands. Agricultural lands can provide many benefits such as in the economic, social and environmental aspects. But, if the conversion function of agricultural land is given no serious attention and proper control, then it will negative impact on the community, regarding that agricultural lands serve important role and provide many benefits for the community.

This research aim is divided into two stages, namely (1) to determine the pattern and distribution of population development of Regency / City in Bali; (2) to determine the pattern and distribution of conversion function of land development of Regency / City in Bali; (3) determine the distribution of paddy (rice) production development of Regency / City in Bali; and (4) analyze the population development and conversion function of land impacts on the paddy (rice) production in Bali province.

LITERATURE REVIEW

Dynamics of Rice Self-Sufficiency

Indonesia is an agrarian country, which is one of producers of agricultural commodities, namely rice. Rice as a agricultural commodity is consumed by changing its form into rice. Rice plays an important value in meeting basic food needs in Indonesia. According to Puslitbang (2012), rice has capability to supply the availability of staple food in Indonesia by 95%; there is another 5% supplied by other substitute foods. There is still high culture in consuming rice. It can be proved by Javanese philosophy saying that one is not said to eat before eating rice. In line with this issue, Indonesia is the third largest rice producer after China (FAO, 2008).

The title as being the third largest producer in the world is supported by broader rice areas than other rice producing countries in the world. There is 70% area of agricultural lands in Indonesia for rice farming, and the remaining is for other agricultural commodities (Firdaus et al, 2008). There was rice self-sufficiency in Indonesia during the leadership of President Soeharto. Rice self-sufficiency was occurred in 1969 and ended in 1984. Ironically, however, after the rice self-sufficiency has ended, Indonesia has heavily imported rice from other countries such as China, Thailand and Vietnam, which those countries have studied rice farming in Indonesia. There is also another problem, namely currently the number of rice production is no longer

based on the expectation. Rice is also said to be an inelastic commodity, in which the number of demand is higher and the amount of offer cannot increase, then it tends to decrease.

Concept of Food Security

Definition of food security is different in each concept, time and place. At least, there are 200 definitions of food security (FAO, 2003 and Maxwell, 1996) and at least there are 450 indicators of food security (Hoddinott, 1999). According to Jonatan Lassa, in his article entitled *Politik Ketahanan Pangan Indonesia* 1950 - 2005, http://www.zef.de/module/register/media/3ddf_Politik%20Ketahanan%20Pangan%20Indonesia%201950-2005.pdf, accessed on 6-4-2016, it stated that the term of *food security* is a concept of new policy which firstly stated in 1974, namely by the application of world food conference (Sage, 2002). Maxwell (1996) tried to explore changes on the definitions of food security since the 1974 world food conference until in the middle of 1990's. There have been changes on global, national, family and individual levels; changes from food perspective as the basic need (food first perspective) until the livelihood perspective and objective perspectives into subjective perspective (Maxwell and Frankenberger, 1992).

The food security covers three dimensions, namely: (a) food availability, (b) access to sufficient food, and (c) utilization of food, which is related to cultural practices. However, these three dimensions are applied in the effort of maintaining stability of food stock. Therefore, these three are often used to measure the achievement of food security. The food availability is defined as the large availability of food to meet the needs of all population, both in terms of its number and its quality; meanwhile, the food distribution is defined as reachable food supply for all areas so that there will be stable and reachable prices for all families. Consumption is defined as ability by each family to access sufficient food and manage nutritious principle consumption and health as well as its preferences.

Population Growth

Population growth is a dynamic balance between any strength to increase and reduce the number of population. Population growth is caused by several components, namely fertility, mortality, in-migration and out-migration. The difference between birth and death is called as natural increase, while the difference between in-migration and out-migration is called as net migration. There are positive effects of population growth on the economic growth in which the condition and progress of the population are closely related to the growth and development of economic enterprises. The population on one hand can play a role as an actor or a resource for the production factor; on another hand, it can serve as the target or the consumer for the

produced products. Population conditions, population data and information will be very useful in calculating the number of labor to be absorbed as well as certain qualifications required and types of technology to be used to produce goods or services. On another hand, knowledge concerning population structure and socio-economic conditions in certain regions will be very useful in calculating the number of people that can take benefits of the development opportunities and results or the market share for a particular business product (Todaro, 2003).

Conversion Function of Agricultural Land

The conversion function of agricultural land into non agricultural land is not fully in a natural manner, but there is also directly or indirectly caused by government policy process (Anwar and Pakpahan, 1990; Winoto, 1995). According to Anwar (1995), in the conversion function of land, there is asymmetric information of land price, so that the price system excludes all information required as the basic for a transaction decision. The asymmetric price is caused by the farmer party (as the one selling his agricultural land) having tendency to have no proper information concerning the agricultural land price. As a result, the market price yet reflects the real value of agricultural land. This result indicates that the price defined through market mechanism having tendency to be under valuation. According to Nasoetion and Winoto (1996), failure of market mechanism in allocating the land optimally is caused by other rent factors, in abandoned paddy fields, such as social function, convenience function, land and water conversion function, and food availability function for next generations.

RESEARCH METHOD

This research uses secondary data or time series data. The data were obtained from BPS Regency / City and BPS Bali Province for the last 5 years. All data obtained are annual data from each regency / city in Bali Province. The time period is chosen based on consideration of data source and available time limitations. Samples in this research are Regencies / Cities in Bali province. The analysis using panel data is a combination of time series data and cross sectional data, using path analysis method.

ANALYSIS AND RESULTS

Development of Regency / City Population in Bali

The highest density is Denpasar City by 6.171 per Km^2, and then Badung and Gianyar Rehency, each of which is 1.298 and 1.277 per Km^2, this indicates that there are a variety of economic activities in these three Regencies and Cities such as in Denpasar City as the center

of government, Badung Regency as the tourism center and also Gianyar Regency as the craft industry center.

Development of Conversion Function of Land in Regencies / Cities in Bali

The highest percentage of land conversion over the last 5 years was recorded in Denpasar City, namely the average conversion function of rice field to non-rice field or non-agricultural land is 148.2 ha per year, followed by Gianyar by 74 hectares and Buleleng with average of 50.6 ha, whereas in total review (Bali) there is 369 ha land of the paddy field that are recorded to be converted into non-rice fields and non-agricultural land.

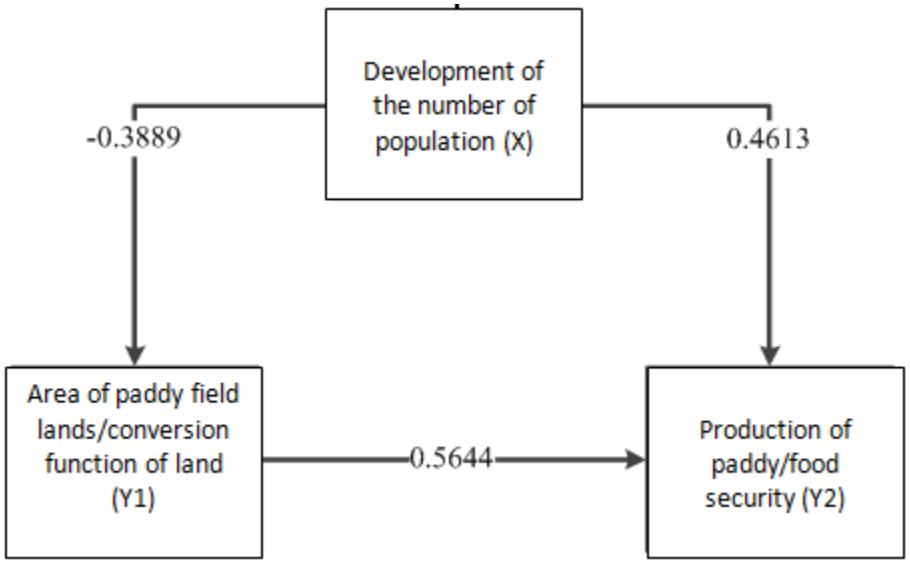
Development of Paddy Production in Regencies / Cities in Bali

In the last five years namely 2011-2015, Tabanan regency is the largest rice producer, which in average, it produces 168,399 tons of paddy per year, followed by Gianyar regency by 147,724 tons and Buleleng regency by 103,671 tons, while the lowest producer is Bangli with production by 26,662 tons

Output of Path Analysis

Path Analysis aims to find out how the influence of independent variables (population development) on the dependent variable (rice production) indirectly.

Figure 1. Path Coefficient Values of Development of the Number of Population and Area of Paddy Field Land



Direct impact of the development of the number of population on (X) the area of paddy field land is -0,3889. This means that the increasing number of population in further era will cause the increasingly decrease area of agricultural land (the conversion function of land is caused by the population that is required housing or other infrastructure). Meanwhile, the direct or insignificant impact of area of paddy field land / conversion function of land on the paddy production / food security in Regencies/ cities in Bali province is 0,5644; it means that though the area of paddy field land increasingly decreases, but the paddy production still provides positive effects. It means that the increased production is affected by many factors, such as land management and land maintenance which most are used technology, so that the paddy production / food security can be increased. Development of the number of population affects positively but insignificantly on the paddy production / food security. By the development of the number of population / positive growth of populatin, then there must be stable food availability both by self producton and import from other regions or other countries. Meanwhile, development of the number of population indirectly affects on the paddy production / food security through the area of paddy field land / conversion function of land by -0.2195. it means that the increasing number of population in the future will cause decreased paddy production, because the paddy field lands have been converted into non agricultural land.

Conversion function of land in the implementation of development is unavoidable, the conversion is done for two reasons, first the need to meet the needs of growing population and secondly related to the increased demand for better quality of life. Land conversion is a specific conversion from the use for agriculture to non-agricultural use. The land conversion is a conversion of land use to other uses, so there are many problems arising from the land conversion that are closely related to land-use policies. Land conversion activities have a variety of patterns depending on the needs of land conversion business. The land conversion pattern can be reviewed from several aspects. First, according to the conversion actors, which are divided into two namely: 1) direct conversion function by the land owner and 2) conversion function that is initiated by conversion of control. The pattern of land conversion reviewed according to its process is divided into two namely gradual and instantaneous (Lestari and Dharmawan, 2011). The factors driving the land conversion are among others, are as follows.

1) Rapid population growth factor implyes in demand for increasingly settlement land from year to year. Increased number of population will affect on the level of demand for housing, it will lead to clearing new land to be used as new housing. Currently, many agricultural lands are converted into settlements, leading to reduced agricultural land due to construction of settlements, not only in any eligible areas to be used as residential areas.

2) Economic factor as an identical one with the problem of poverty. Rural people having incapability to make ends meet through low level of agricultural product sale, try to find other forms of business so that they can improve their welfare. To get the capital in starting their business, the farmers generally sell their lands. The rural people think that they will get higher profit from the sale of agricultural land for industrial activities than the selling price for the agricultural interests. On the other hand, agricultural farming requires high costs while the results obtained are only given small number of profit. So farmers prefer some of their agricultural land to be sold for non-agricultural activities.
3) Government policy is mainly related to the change of spatial plan (RTRW), the policy of development direction and by the market mechanism. Conversion of land is caused by lack of understanding by the community or government officials on spatial planning, or spatial plans that are difficult to achieve. There is also development policy that emphasizes on the growth aspect through easiness on investment facilities, then there will be broader chances for conversion of land use from agriculture to non-agricultural. There are three national policies that directly affect on the conversion of agricultural land to non-agricultural land.

Through the conversion of agricultural land to non-agricultural land, it affects on:

1) **Decreased agricultural land.** the conversion of agricultural land to non-agricultural land automatically decreases the number of agricultural land. This certainly affects negatively on various aspects both directly and indirectly.
2) **Decreased food production.** The decreased number of agricultural land will disrupt the production results. In big scale, it will not also be easy to achieve regional and national food stability. Regarding that the increasing number of population each year will also increase the demand on food, but in fact the agricultural land will decrease.
3) **Threating on ecosystem balance.** Through various diversity of population, paddy field or agricultural land is a natural ecosystem for some animals. So, if there is conversion of agricultural land, then the animals will lose their living habitats and it can disrupt the population housing area. Also, the agricultural land can be used to utilize rain water properly to reduce any risk for flood at rainy season.
4) **Many farm workers losing their job.** Farm workers are people having no agrocultural lands. They offer their services to manage other people's lands. So, if there is conversion of agricultural land and the agricultural land is decreased in number, then the farm workers will lose their living.

5) **Increasingly expensive price of food products.** If there is decreased number of agricultural production, then there will be increasing difficult to find out food products in the market. This will certainly be used by any producers or sellers to obtain big profits, leading to increasingly expensice price of food products.
6) **High number of urbanization.** Most of agricultural lands are located in urban areas. So, if there is conversion of agricultural land, it cause to close some of job living for some people. Then, there will be increased number of urbanization. Urban people will directly go to cities with expectation to obtain better living. In fact, arrriving at the cities, their condition may not be changed because of tense competition.

CONCLUSION

Uncontrolled development of the population will result in provision of infrastructure, especially settlements, while very limited number of large areas will cause uncontrolled land conversion and this uncontrolled land conversion will certainly provide negative impacts on the agriculture aspect in the future, especially rice fields. The conversion of productive agricultural land is increasing and uncontrollable, which will lead to decreased number of rice production and threaten food security and food sovereignty, while the food demand for the population is increasing as a result of the population growth. So, there will be imbalance situation between the tools of satisfying needs with the increasing needs, this can be proven by the very significant population impacts on the area of agricultural lands, as well as the development of population will affect on the provision of rice in the Regencies / cities in Bali in the future, so there will be food crisis.

RECOMMENDATIONS

1) The government should be more serious in responding to any problems related to land conversion, especially agricultural land (paddy fields) mainly in establishing policy and legislation in order to maintain food security and food sovereignty.
2) It is necessary for the government to make regulations concerning the conversion of land used by the community as guidelines in building infrastructure, especially housing and tourism accommodation.
3) The public should be aware of the importance of agricultural land especially agriculture (rice field) to meet the food needs of the population and in addition, also particularly for Balinese community, since the ownership of paddy fields is closely related to "*Ayahan desa*".

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