

The Impact of Population Growth to the Agriculture Land Conversion and Sustainability of *Subak* as World Cultural Heritage

Anak Agung Sri Purnami¹, Ni Made Santini²

¹(Faculty of Economics/ Warmadewa University, Indonesia)

²(Faculty of Economics/ Warmadewa University, Indonesia)

Corresponding Author: Anak Agung Sri Purnami (agungpurnam@yahoo.com)

Abstract: Culture of agriculture in Bali has its own uniqueness that is the organization of farmers known as subak. Subak is a community organization with members of farm households that prioritize regulating rice field irrigation system for its members that are used in rice cultivation. UNESCO has established subak landscape as world cultural heritage, one of which is Subak Pulagan in Gianyar Regency. The objectives of this research are: (1) to know the impact of population growth on agriculture land conversion; (2) to know the impact of population growth and agriculture land conversion to subak sustainability; and (3) to know the indirect effect of population growth on subak sustainability through agriculture land conversion. The population is 160 farmers, and the sample is 62 farmers. Data analysis method used in this research is SEM-PLS. The results showed that the population growth had a positive and significant impact on the conversion of agricultural land. However, the population growth has no significant effect on the sustainability of subak, while the conversion of agricultural land has a negative and significant impact on subak sustainability. Indirectly, the population growth significantly influences the subak sustainability by the nature of full mediation.

Keywords: Agriculture land conversion, Farmers welfare, Population growth, Subak sustainability, World cultural heritage.

Date of Submission: 17-08-2017

Date of acceptance: 30-08-2017

I. INTRODUCTION

The country of Indonesia is known as an agricultural country and has a very large population. The population is growing every year. It causes the vulnerability of productive land in Indonesia to support the needs of land due to the development of the population. According to Kustiawan (1997), in a macro perspective, the phenomenon of agricultural land conversion in developing countries occurs due to the structural transformation of the economy and demographics.

The occurrence of the conversion of agricultural land to non agricultural is generally caused by 1) External factors are the impact of the transformation of economic and demographic structures. Land is unchanged, but demand is increasing due to population growth. As a result, land use shifts to more profitable agriculture to non-farm activities; 2) The internal factor causing land conversion is poverty. Poor socio-economic conditions trigger farmers to sell their agricultural land. They feel they are not getting the economic benefit from the land.

Culture of agriculture in Bali has its own uniqueness that is the organization/association of farmers known as subak. Subak is a community organization with members of farm households that prioritize regulating rice field irrigation system for its members that are used in rice cultivation and rice cultivation, as well as a media liaison between the government/other parties in terms of agricultural interests. UNESCO has established subak landscape as a world cultural heritage, one of which is Subak Pulagan in Tampaksiring Village, Gianyar Regency.

The objectives of this research are (1) to know the impact of population development on the conversion of agricultural land; (2) to know the impact of population development change and land conversion to subak sustainability; And (3) to know the indirect effect of population development on subak sustainability through agriculture land conversion.

II. LITERATURE REVIEW

2.1 Population Growth

Population growth is a dynamic balance between the forces that increase and reduce the population. Knowledge of the population structure and socio-economic conditions of a particular region will be useful in calculating how many people will be able to take advantage of development opportunities or results or the extent of market share for a particular business product (Todaro, 2003). The obstacles to suppressing the rate of population growth in developing countries are generally due to the conservative nature of conservative thinking, which in essence rejects changes in traditional values and Indonesian culture including in traditional and religious heterogeneous societies, for example that many children mean much of the fortune or pattern of thinking that children is an investment for his parents in the future (Hasnida, 2002).

2.2 Land Conversion

Land use transfer is a transformation in the form of allocating land resources from one use to another. Intercropping is a mixed cultivation of two or more types of crops in one area of land at the same time. While overlapping is an activity of planting for a season or more consisting of several types of crops that are planted in rotation or insert to increase soil productivity (Pakpahan, et al., 1989). Broadly speaking, to know the perception of farmers about the transfer of agricultural land functions can be distinguished on the dimensions of social and cultural aspects, technical aspects, and economic aspects.

2.3 Sustainability of Subak

Subak as a socio-agrarian organization of traditional farmers in Bali is a way of life of Balinese people. Once established as a world cultural heritage, subak sustainability should be maintained, through social resilience, economic resilience, and ecological resilience. Social resilience in this context refers to the ability of society, social institutions or social communities associated with agricultural land to survive and be able to cope with change due to land conversion. In the case of Bali, the institutional existence of subak represents the social institution. In line with this context, Suradisatra (2008) mentions this social resilience with the term "social resilience" (social resilience). Social resilience reflects the group's efforts or institutional society maintaining institutional and social values as well as local norms in the process of intervention or introduction of external values and norms. Economic resilience refers to the ability of people who are economically able to cope with change as a result of land conversion processes. By comparing several economic variables, such as employment opportunities, income and welfare levels before and after land conversion, this terminology can be understood. In the institutional context, subak economic resilience can be observed from various aspects, such as asset ownership and its role in service for members while ecological endurance refers to subak understanding as an ecosystem. The simplest thing that can be seen in the subak ecosystem after the occurrence of land transfer function is related to water debit, water pollution and paddy fields, the condition of wetland biota, yield productivity and sustainable farming. Rice fields that have undergone change function have changed allotment, so that many waste will be wasted to paddy field because activity at its utilization.

III. METHODS

This study uses the primary data types obtained by providing questionnaires to farmers in Subak Pulagan. The population is 160 peasants, and the sample is 62 farmers. Data analysis method used in this research is SEM-PLS. Data analysis includes outer model evaluation, structural model testing, and hypothesis testing.

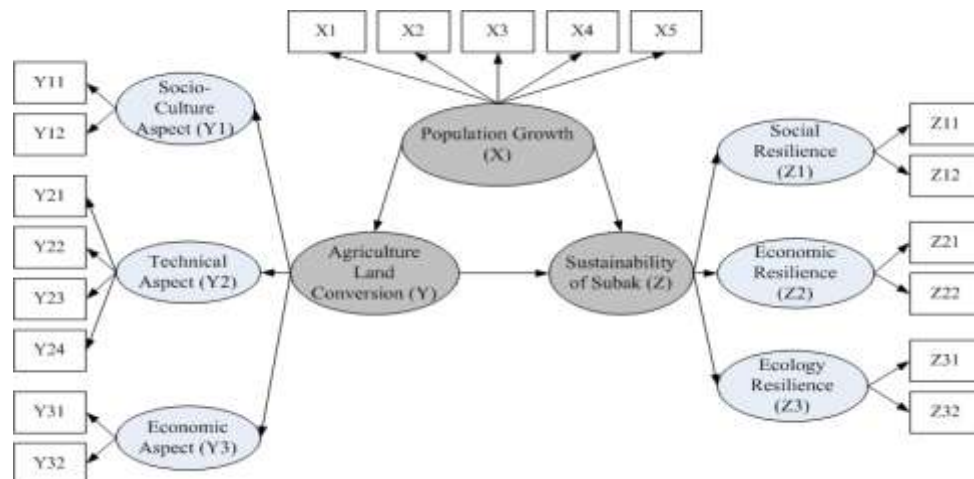


Figure 1. Conceptual Framework

The hypothesis in this research are: (1) The population growth directly has a positive and significant effect on the conversion of agricultural land; (2) Direct population growth has a negative and significant effect on subak sustainability; (3) Direct conversion of agricultural land has a negative and significant effect on subak sustainability; And (4) Indirect population growth has significant effect to subak sustainability through agriculture land conversion.

IV. RESULTS AND DISCUSSION

4.1 Outer Model Evaluation

An indicator can be said to be valid (convergent validity) if it has a loading factor above 0.6 and AVE above 0.5 against the construct or first order construct that is intended. It should be remembered that the variables of agricultural land conversion and subak sustainability are the second order construct. Appendix 1. shows that all research indicators have constructs above 0.6 with their constructs. Similarly, the Average Variance Extracted (AVE) value greater than 0.5, it can be said that all research indicators are valid.

Discriminant validity measurements of the measurement model can be assessed on the basis of cross loading measurement indicators with their constructs. Appendix 2. presents a comparison between the correlation indicator of a construct with the correlation of the indicator with another construct. Appendix 2. shows the correlation of the construct indicator has a higher value than the correlation of the indicator with another construct, it is said that the construct has a high discriminant validity.

There are two latent variables which are the second order construct, namely the variable of land conversion function and the subak sustainability. Table 1. shows cross loading on first order construct with latent variables. First between variables Y with Y1, Y2, and Y3 and between variables Z with Z1, Z2, and Z3. The value of cross loading is also the path coefficient between the first order construct with the latent variable formed. Table 1. shows that the relation between first order construct and second order construct in this research is significant (at significance level 0,05).

Table 1. Path Coefficient Results Between Latent Variable with First Order Construct

Variable Relation	Path Coefficient	
	Coefficient	Sig.
Socio-Culture Aspect (Y1) → Agriculture Land Conversion (Y)	0.871	0.000
Technical Aspect (Y2) → Agriculture Land Conversion (Y)	0.960	0.000
Economic Aspect (Y3) → Agriculture Land Conversion (Y)	0.820	0.000
Social Resilience (Z1) → Sustainability of Subak (Z)	0.940	0.000
Economic Resilience (Z2) → Sustainability of Subak (Z)	0.870	0.000
Ecology Resilience (Z3) → Sustainability of Subak (Z)	0.935	0.000

Cronbach's Alpha measures the lower limit of the reliability value of a construct, whereas Composite Reliability measures the true value of the reliability of a construct (Chin and Gopal in Salisbury et al 2002). The Role of thumb value of Cronbach's Alpha or Composite Reliability should be greater than 0.7, but if the results obtained close to 0.7 (such as 0.6), it is still acceptable in exploratory studies (Hair et al, 2010) . The results of construct reliability test can be seen in Table 2.

Table 2. Cronbach's Alpha and Composite Reliability

Construct	Cronbach's Alpha	Composite Reliability
Population Growth (X)	0.767	0.842
Agriculture Land Conversion (Y1)		
Socio-Culture Aspect (Y1)	0.773	0.898
Technical Aspect (Y2)	0.830	0.887
Economic Aspect (Y3)	0.841	0.926
Sustainability of Subak (Z)		
Social Resilience (Z1)	0.853	0.931
Economic Resilience (Z2)	0.610	0.835
Ecology Resilience (Z3)	0.751	0.889

Table 2. shows the value of Cronbach's Alpha and Composite Reliability of each construct worth greater than 0.70 so it can be said that the measurement used in this study is reliable.

4.2 Structural Model/Inner Model Evaluation

The structural model in the PLS needs to be evaluated by using R-square for the dependent variable and its significance value based on the value of t-values on each path.

Table 3 Value of R-square

Dependent Variable	R Square
Agriculture Land Conversion	0.204
Sustainability of Subak	0.132

Table 3. shows the R-square value of 0.204 for the conversion of agricultural land functions. This means that the variability of the conversion of agricultural land functions can be explained by the construction of population growth of 20.4 percent. The remaining 79.6 percent is explained by other factors. Furthermore, the subak conservation construct is explained by the construction of population development and the transfer of agriculture land by 13.2 percent. The remaining 86.8 percent is explained by factors other than both.

Based on R² in Table 5.6 then it can be calculated Q2 or Stone Geiser Q-Square test, that is:

$$\begin{aligned}
 Q2 &= 1 - \{(1 - 0.204)(1 - 0.132)\} \\
 &= 1 - \{(0.796)(0.868)\} \\
 &= 0.309
 \end{aligned}$$

The calculation result of Q2 is 0.309 so it can be said to have sufficient predictive prevalence, so the resulting model is feasible to be used to predict. Figures of 0.309 can be interpreted that the variation of subak sustainability by 30.9 percent is explained by variations in population development variables and agriculture land conversion, while the remaining 69.1 percent is explained by other variables outside the model.

4.3 Hypotheses Testing

To perform hypothesis testing, it is necessary to analyze direct influence, indirect influence, and total influence among research variables. The result of the analysis related to the influence between research variables is presented in Table 4..

Table 4. Path Coefficient

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
Population Growth → Agriculture Land Conversion	0.451	0.476	0.114	3.955	0.000
Population Growth → Sustainability of Subak	-0.066	-0.062	0.246	0.268	0.394*
Agriculture Land Conversion → Sustainability of Subak	-0.329	-0.345	0.169	1.940	0.026

Note: *) Non Sig (α = 0,05)

Table 5. Indirect Effect

Construct	Original Sample	T Statistics	P Values	Note
Population Growth (X) → Sustainability of Subak (Z)	-0.148	1.862	0.042	Full Mediation

Table 6. Summary of Direct Effect, Indirect Effect, and Total Effect Among Research Variables

Independent Construct	Dependent Construct					
	Agriculture Land Conversion (Y)			Sustainability of Subak (Z)		
	DE	IE	TE	DE	IE	TE
Population Growth (X)	0.451		0.451	-0.066	-0,148	-0.214
Agriculture Land Conversion (Y)				-0.329		-0.329

Where: DE = Direct Effect
 IE = Indirect Effect
 TE = Total Effect

Based on the coefficient and the significance of the results of the analysis of direct influence, indirect effect, and total influence, it can be formulated hypothesis testing results as follows.

Table 7. Result of Hypotheses Testing

Hypotheses	Description	Result
Hypotheses 1 :	Population growth directly has positive and significant effect on agriculture land conversion	Hypotheses Accepted
Hypotheses 2 :	Population growth directly has a negative and significant effect on the subak sustainability	Hypotheses Denied
Hypotheses 3 :	Agriculture land conversion has a negative and significant effect on subak sustainability	Hypotheses Accepted
Hypotheses 4 :	Population growth indirectly has significant effect on subak sustainability through agriculture land conversion	Hypotheses Accepted

4.4 Discussion

The results showed that the population growth directly affects positively and significantly to the conversion of agricultural land in Subak Pulagan Tampaksiring Village, Gianyar Regency. This means that if the development of society increases, it will result in increased conversion of agricultural land. On the contrary if the public perception supports to reduce population growth, it will be able to prevent the conversion of agricultural land. Respondents' perceptions of population growth variables show considerable value, meaning that most farmers do not agree with statements related to population growth in developing countries. Farmers in Subak Pulagan have enough control over population growth through birth control.

Based on the data analysis, it is known that the population growth directly affects the negative but not significant to the sustainability of subak. This means that the fluctuation of population development has no significant effect on the existence of subak. Subak sustainability is mainly influenced by the presence of water, agricultural land, and subak membership. During this subak membership is hereditary, so very rarely changes in the population directly affect the subak preservation. As long as the function of agricultural land is not transferred, then the subak membership will survive.

While the direct conversion of agricultural land has a negative and significant impact on subak sustainability. If farmers change land, farmers no longer farm and do not become subak members. If there continues to be a reduction in the amount of agricultural land and subak members, it will threaten the sustainability of subak. The result of data analysis shows that indirect population development significantly influences subak sustainability through agriculture land conversion. Given that the direct development of the population has no significant effect on the sustainability of subak, then mediation is full mediation (full mediation). Indeed, in awig-awig subak has not been set about the conversion of agricultural land, so farmers have the right to change land functions. However, according to the results of interviews with *Pekaseh* (the head of subak) Subak Pulagan, explained that until now no farmers who decided to reside in rice fields. Land use change that has been happening so far is only to make the camp/break for the farmers, which is not so wide and semi-permanent. In addition, farmers consider rice fields as *cecatu* or hereditary heritage that are hereditary and must be preserved.

V. CONCLUSION

The conclusions in this study are: (1) The population growth has a positive and significant impact on the conversion of agricultural land in Subak Pulagan, Tampaksiring Village, Gianyar Regency. This means that if the population is growing in number then it can increase the interest of farmers to change the function of agricultural land; (2) Population growth and conversion of agricultural land have a negative impact on the sustainability of Subak Pulagan. This means that the higher population growth and land conversion function will have a bad impact on subak sustainability. However, the population growth had non significant impact on subak sustainability, while the conversion of agricultural land had a significant impact; And (3) Indirect population growth has significant effect to subak sustainability in Subak Pulagan through agriculture land conversion. The type of mediation in this relationship is full mediation. There are several things that can be suggested: (1) The Government of Gianyar Regency, through the Office of Women Empowerment, Child Protection, and Population Control needs to educate all levels of society on the importance of family planning programs; And (2) Gianyar Regency Government needs to prepare a regulation as a form of incentive for farmers who keep their agricultural land in the middle of increasing land selling price.

REFERENCES

- [1] Kustiawan, A., Agriculture Land Conversion in North Beach Area of Java Island, *Prisma*, No. 1, Tahun XXVII, Januari 1997.
- [2] Todaro, Michael P., *Economic Development in Third World*. Translator: Aminuddin and Drs.Mursid (Jakarta: Ghalia Indonesia, 2003).

- [3] Hasnida. *Crowding and Density*. library.usu.ac.id/download/fk/psikologi-hasnida2.pdf. 2002.
- [4] Pakpahan, A. and Affendi Anwar, Factors that Affect Rice Field Conversion, *Jurnal Agro Ekonomi*, 8 (1), 1989, 62-74.
- [5] Suradisastra, K., S.M. Pasaribu, B. Sayaka, A. Dariah, I. Las, Haryono, E. Pasandaran, *The Effect of Land Conversion to the Social-Economic and Ecology Resilience in Bali*. Reversing the Degradation Trends of Land and Resources (Bogor: PT Penerbit IPB Press, 2010).
- [6] Salisbury, W.D., Chin, W.W., Gopal, A., and Newsted, P. R., Research report: Better Theory through measurement-developing a scale to capture consensus on appropriation. *Information System Research*, 2002.
- [7] Hair, J.F. et al., *Multivariate data Analysis*, 7th edition, (New Jersey: Pearson Education Inc, 2010).

Appendix

Appendix 1. Loading Factor and Average Variance Extracted Value

Output	Indicator	Construct						
		X	Y1	Y2	Y3	Z1	Z2	Z3
Outer Loading	X1	0.783						
	X2	0.664						
	X3	0.654						
	X4	0.647						
	X5	0.831						
	Y11		0.909					
	Y12		0.896					
	Y21			0.793				
	Y22			0.752				
	Y23			0.848				
	Y24			0.860				
	Y31				0.913			
	Y32				0.943			
	Z11					0.942		
	Z12					0.925		
	Z21						0.812	
	Z22						0.880	
	Z31							0.883
Z32							0.906	
AVE		0.518	0.815	0.663	0.861	0.872	0.717	0.800

Appendix 2. Cross Loading

Indicator	Construct						
	X	Y1	Y2	Y3	Z1	Z2	Z3
X1	0.783	0.278	0.288	0.433	-0.309	-0.341	-0.204
X2	0.664	0.261	0.294	0.388	-0.017	-0.096	-0.070
X3	0.654	0.163	0.257	0.332	-0.067	-0.124	-0.216
X4	0.647	0.095	0.190	0.439	0.034	-0.037	-0.006
X5	0.831	0.153	0.322	0.440	-0.171	-0.123	-0.139
Y11	0.299	0.909	0.734	0.542	-0.322	-0.475	-0.414
Y12	0.196	0.896	0.711	0.436	-0.303	-0.330	-0.316
Y21	0.051	0.761	0.793	0.442	-0.245	-0.245	-0.232
Y22	0.522	0.467	0.752	0.725	-0.218	-0.218	-0.216
Y23	0.281	0.700	0.848	0.494	-0.327	-0.249	-0.278
Y24	0.388	0.673	0.860	0.589	-0.229	-0.143	0.223
Y31	0.537	0.424	0.530	0.913	-0.090	-0.212	-0.093
Y32	0.508	0.571	0.731	0.943	-0.267	-0.166	-0.254
Z11	-0.202	-0.367	-0.358	-0.239	0.942	0.709	0.882
Z12	-0.128	-0.274	-0.218	-0.130	0.925	0.624	0.673
Z21	-0.075	-0.354	-0.230	-0.131	0.524	0.812	0.510
Z22	-0.286	-0.403	-0.231	-0.203	0.678	0.880	0.689
Z31	-0.093	-0.312	-0.198	-0.099	0.727	0.546	0.883
Z32	-0.241	-0.410	-0.317	-0.243	0.774	0.727	0.906

*Anak Agung Sri Purnami. "The Impact of Population Growth to the Agriculture Land Conversion and Sustainability of Subak as World Cultural Heritage." *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)* , vol. 22, no. 08, 2017, pp. 13–18.