

## Effectiveness of Agricultural Insurance Program as A Sustainable Agricultural Development Effort

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### Abstract

*In an effort to develop agriculture, especially as a protection for farmers against crop failure, the provincial government of Bali through the National Food Security program has established Badung Regency as a pilot project for implementing agricultural insurance through the Jasindo Insurance Company. This concept is applied as a guarantee for farmers in terms of price fluctuations of agricultural products that tend to decline, thus triggering the reduction of agricultural terrain that increases each year in Bali Province. This study goals to analyse the level of effectiveness of the agricultural insurance program and to analyze the factors that affect the level of effectiveness of the insurance program as an attempt to develop sustainable agriculture in Bongkasa Village, Abiansema Region, Badung Regency. The method of analysis in this research is done quantitatively, namely this study uses two analyzes, namely descriptive analysis which is used to analyze the level of effectiveness of agricultural insurance programs and Confirmatory Factor Analysis which is used to confirm latent variables and indicators. The results of the analysis show that the level of effectiveness of the agricultural insurance program is 81.75 percent with effective criteria. The variable that has a dominant affect on the performance of the insurance program as an effort to develop sustainable agriculture is the process variable which is then followed by the output variable and the input variable.*

*Keywords: Effectiveness, Agricultural Insurance, Rice, Sustainable Agriculture*

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### 1. Introduction

Agriculture is one of the sensitive elements in the economic life of the community because fluctuations in availability and prices will have implications for other interrelated sectors[25]. The agricultural front contains food crops, livestock, horticulture, plantations, fisheries, and forestry, in 2013 infiltrated 46.3% from the total workforce, contributed 6.9% of the total value of non-oil exports, and contributed 15 % of Domestic Income[16]. Technically, business activities in the agricultural sector will always be faced with a fairly high risk of uncertainty[13]. The risk of this uncertainty includes the level of crop failure caused by natural disasters such as floods, droughts, or attacks by plant-disturbing organisms, and climate change which results in decreased production yields and even crop failures as well as the risk of price fluctuations so that farmers' incomes decline or suffer losses[3].

The impact of this risk is that the farmers suffer large enough losses so that for the next business they do not have any more capital or even the farmers who borrow credit are unable to return it, resulting in bad loans[15]. This uncertainty and high risk allows farmers to switch to other commodities that have high economic value with a smaller risk of failure[22]. Risks to agriculture not only affect farmers, but also have an overall impact on the agribusiness value chain[12]. If this is allowed to continue, it is feared that it will have an impact on the stability of national food security,

especially the production and availability of rice staple food[24].

The food security program initiated by the government offers one way to compensate for crop failure through agricultural insurance[18]. Agricultural insurance is one of the farmer protection strategies set by the government and local governments in accordance with their authority[14]. Increasing food productivity to realize food security, based on the principles of agricultural life, namely advanced, ecologically friendly, sustainable, the law must encourage and direct agricultural life technically to always be more perfect and benefit all parties[2]. In an effort to achieve food security, President Joko Widodo targets to control food imports by increasing domestic food productivity, eradicating the import mafia, and also developing agricultural exports based on agricultural processing[17]. So that in the event of crop failure, especially those caused by natural disasters, farmers will not bear their own losses because their agricultural land has been insured. The agricultural insurance program initiated by the government is a special effort to increase rice productivity, but businesses in the agricultural sector, especially rice farming, are faced with the risk of crop failure losses that can happen to farmers at any time[9]. The government seeks to protect agricultural products by implementing an agricultural insurance program[20]. According to Pasaribu, in an effort to develop agriculture in the future, it is very important to have agricultural insurance, so that in the event of crop failure caused by natural disasters (floods and landslides), or being attacked by pests and diseases, farmers will not bear the loss themselves because their agricultural land has been insured [8]. Based on the above background, the purpose of this study was to analyze the level of effectiveness of the agricultural insurance program based on input, process and output variables as an effort to develop sustainable agriculture in Bongkasa Village, Abiansemal District, Badung Regency.

## 2. Material and Methods

This study uses qualitative data that has been quantified, so this research uses a quantitative approach. The research location is Bongkasa Village, Abiansemal Region, Badung Regency. The object of this research is farmers who use agricultural insurance in overcoming the risk of crop failure. Respondents in this study were 100 people. The population of this research is 498 farmers in Citra *subak* and Segempel *subak*. The method of taking respondents is by purposive sampling technique, namely sampling intentionally. Respondents who implemented the rice farming insurance program for the last three to five years.

Instrument testing is done by examining the validity and reliability test. Validity test is done by comparing the obtained correlation coefficient (r) and its significance is tested by comparing it with r table. If  $r_{count} > r_{table}$ , then this question number is declared valid. In addition, the validity test was carried out by looking at the Cronbach alpha value between 0.64-0.90[4]. This study uses two analytical techniques, namely descriptive analysis technique which is used to analyse the level of effectiveness of the agricultural insurance program in Bongkasa Village, Abiansemal Region, Badung Regency. To find out whether the answer is effective or not, it is known by a measurement scale. Grouping the assessment of respondents' answers based upon the average Likert scale are 1) 1.00-1.49 = very ineffective, 2) 1.50-2.49 = not effective, 3) 2.50-3.49 = quite effective, 4) 3.50-4.49 = effective, and 5) 4.50 = very effective[23]. After that, the average of each indicator in the form of a percentage is sought with the following calculations:

$$\text{Effectiveness} = \frac{\text{The average of each indicator} \times 100 \%}{\text{Maximum scale}}$$

The effectiveness ratio is evaluated using the Research and Development standards of the Ministry of Home Affairs of the Republic of Indonesia. The effectiveness ratios are as follows: 1) Effectiveness Ratio below 40.00% is very ineffective, 2) Effectiveness Ratio between 40.00-59.99% is not effective, 3) Effectiveness Ratio is between 60-79, 99% is quite effective and 4) Effectiveness Ratio above 80% is very effective[23].

The second analysis technique is Confirmatory Factor Analysis which is used to analyze the factors that affect the level of effectiveness of the agricultural insurance program in Bongkasa Village, Abiansemal Region, Badung Regency. The factor analysis can be used to measure construct validity which indicates how well the results achieved from the use of gauges are in accordance with the theories used to explain a construct[10]. By using the Partial Least Square (PLS) analysis, it specifies the relationship between outer model and inner model variables. The outer model (the measurement model) is the relationship between the indicator and its latent variable, and the inner model (the inner relation) describes the relationship between latent variables based on the substance of the theory.

### 3. Results And Discussion

#### 3.1. Descriptive Analysis

Based on the results of the study, the level of effectiveness of the agricultural insurance program in Bongkasa Village, Abiansemal Region, Badung Regency is described in detail in Figure 1.

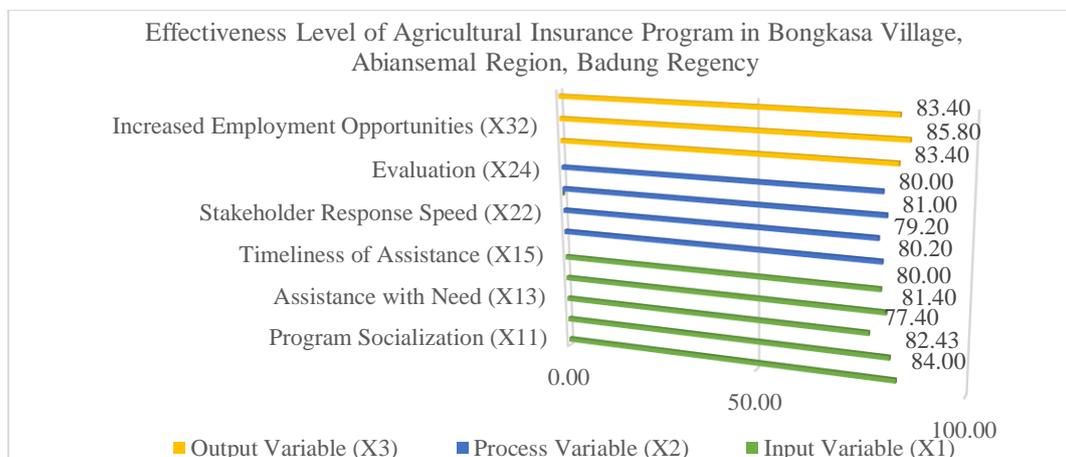


Figure 1. Effectiveness Level of Agricultural Insurance Program in Bongkasa Village, Abiansemal Region, Badung Regency

Based on Figure 1, in the Input Variable (X1), the highest percentage value is the indicator of the Agricultural Insurance Socialization Program (X1.1) of 84.00% which is classified as an effective criterion. The increasing intensity of acceptance of the socialization of the agricultural insurance program, the more often subak members receive socialization activities from the chairman, subak administrators, and extension workers at each stage, so as to increase the participation of subak members in the implementation of the agricultural insurance program[24]. Subak is an organization of irrigated rice fields based on tri hita karana (harmonization of human relationships with God, humans, and the natural environment) in Bali. In the Output Variable (X2), the highest percentage value is the monitoring indicator (X2.3) in the implementation of the agricultural insurance program of 84.00% which is classified as an effective criterion. Monitoring of the agricultural insurance program has an important role in measuring the implementation performance of Subak farmers[19].

The distribution of aid funds to finance members' productive businesses and the availability of supporting facilities for group activities and farming activities are characteristics of the successful implementation of programs that provide benefits[7]. Output variable (X3) in its implementation, the highest percentage value is an indicator of increasing employment opportunities (X3.2) of 85.80% which is classified as an effective criterion. The role of agricultural insurance programs in increasing productivity and sustainability of farming businesses will have an impact on high job opportunities[11]. This is what spurs farmers to follow the full implementation of agricultural insurance[5]. Based on the average of the three variables, the value of the effectiveness of the agricultural insurance program is at a value of 81.75%, which means that the implementation of the agricultural insurance program is quite effective.

### 3.2. Instrument Test Results

Validity and reliability tests were carried out using the SPSS (Statistical Package for the Social Sciences) program. The results of the validity and reliability tests are shown in Tables 4 and 5. Because  $df = 96$  ( $df = n-2$ ) and the significance level is 5 percent, the r table value = 0.167. Table 4 shows that the count of all indicators is greater than 0.167 then all indicators are declared valid. In addition, Table 5 shows that the Cronbach Alpha value  $> 0.6$  means that all variables are said to be reliable.

Table 1.  
Validity Test Results

No	Variable	Correlation Coefficient (r count)	r table	Conclusion
1	Input Variable (X1)			
	Program Socialization (X11)	0.621	0.173	Valid
	Accuracy of Assistance with Need (X12)	0.471	0.173	Valid
	Assistance with Need (X13)	0.832	0.173	Valid
	Amount of Assistance Accuracy (X14)	0.683	0.173	Valid
	Timeliness of Assistance (X15)	0.654	0.173	Valid
2	Process Variable (X2)			
	Coaching/Training/Mentoring (X21)	0.789	0.173	Valid
	Stakeholder Response Speed (X22)	0.853	0.173	Valid
	Monitoring (X23)	0.871	0.173	Valid
	Evaluation (X24)	0.884	0.173	Valid
3	Output Variable (X3)			
	Revenue Increase (X31)	0.943	0.173	Valid
	Increased Employment Opportunities (X32)	0.921	0.173	Valid
	Improved Welfare (X3)	0.937	0.173	Valid

Source: Primary Data Processed, 2022

Table 2  
Reliability Test Results

No	Variable	Cronbach's Alpha	Conclusion
1	Input Variable	0.653	Reliable
2	Process Variable	0.875	Reliable
3	Output Variable	0.938	Reliable

Source: Primary Data Processed, 2022

**3.2.1. Confirmatory Factor Analysis**

**3.2.1.1. Outer Model Evaluation**

The evaluation of the Outer model of the effectiveness of the agricultural insurance program is shown in Table 4. The measurement of the reflective indicator shows a change in an indicator in a construct if other indicators are removed from the model. The recommended value in convergent validity is 0.5 or more so that this indicator is said to be valid. Because all indicators have a value of more than 0.5, the indicator is not removed from the model and is declared valid or meets the Convergent Validity criteria.

Table 3  
Evaluation Value of Convergent Validity (CV) Outer Model

Indicator <- Construct Variable	Original sample	Standard Deviation	t-statistic	Sig
X11 <- X1	0.711	0.142	4.528	0.000
X12 <- X1	0.728	0.164	3.563	0.000
X13 <- X1	0.732	0.123	5.022	0.000
X14 <- X1	0.728	0.161	4.738	0.000
X15 <- X1	0.713	0.188	2.853	0.004
X21 <- X2	0.804	0.172	4.139	0.000
X22 <- X2	0.892	0.153	4.952	0.000
X23 <- X2	0.951	0.182	4.312	0.000
X24 <- X2	0.808	0.213	4.376	0.000
X31 <- X3	0.752	0.268	3.783	0.000
X32 <- X3	0.990	0.253	3.674	0.000
X33 <- X3	0.832	0.249	3.713	0.000

Source: Primary Data Processed, 2022

Cross-loading value shows the correlation between indicators and construct variables. Cross-loading digunakan untuk mengetahui apakah suatu konstruk memiliki Discriminant Validity (DV) yang memadai, dengan membandingkan indikator korelasi suatu konstruk. Jika nilai korelasi konstruk memiliki nilai yang lebih tinggi pada konstruk dibandingkan dengan korelasi terhadap konstruk lainnya, maka konstruk ini dikatakan memiliki Discriminant Validity (DV) yang tinggi [23]. Table 3 shows that all construct indicators have adequate DV because they have higher scores on their constructs, compared to other constructs. In addition to cross-loading the evaluation of the outer model can be done by looking at the composite reliability, Cronbach alpha and AVE of each construct as shown in Table 4.

Table 4  
Composite Reliability, Cronbach Alpha, and AVE of Each Construct Variable

Construct Variable	Composite Reliability		Cronbach Alpha	AVE	
	Original Sample	Sig.		Original sample	Sig.
Input	0.732	0.000	0.621	0.387	0.000
Process	0.885	0.000	0.843	0.684	0.000
Output	0.932	0.000	0.940	0.872	0.000

Source: Primary Data Processed, 202

The composite reliability criteria are said to be satisfactory if the value is above 0.7. In addition, a good Cronbach alpha value is  $> 0.6$  and an AVE value  $> 0.50$ . Based on this criterion, all constructs can be said to be adequate, even though the AVE value for the input construct variable is below 0.5, but when viewed from the sig value, the input construct variable shows significant so that it can be used in the measurement model.

3.3.2.2. Evaluation of inner model

Inner model evaluation used to confirm the validity of the first construct (input, process and output) on the level of effectiveness of the agricultural insurance program in Bongkasa Village, Abiansemal Region, Badung Regency. Evaluation of the Inner Model is shown in Table 5.

Table 5 Composite Reliability, Cronbach Alpha, and AVE Each Construct Variable

Variable dependent	<- Construct Variable	Path Coefficients	t-statistic	Sig
Agricultural Insurance Effectiveness (Y)	Input Variable	0.328	8.835	0.000
	Process Variable	0.531	6.467	0.000
	Output Variable	0.472	4.956	0.000

Source: Primary Data Processed, 2022

A variable is said to be significant if it has a t-statistic value greater than 1.96 [23]. Table 10 explains that the input variable with a t-statistic of 8.826 > 1.96 indicates that Hypothesis 1 is accepted, meaning that the input variable has a significant effect on the effectiveness of the agricultural insurance program. In addition, the process variable with a t-statistic of 6.454 > 1.96 indicates that Hypothesis 2 is accepted, meaning that the process variable has a significant effect on the effectiveness or performance of the agricultural insurance program, and the output variable with a t-statistic of 4.940 > 1.96 indicates that Hypothesis 3 accepted, meaning that the output variable has a significant effect on the effectiveness or performance of the agricultural insurance program in Bongkasa Village, Abiansemal Region, Badung Regency.

Apart from being seen from the path coefficient and t-statistics values, the inner model evaluation is also seen from the R<sup>2</sup> value for the dependent latent variable. An R<sup>2</sup> value of 0.67 or more is said to be good, 0.33-0.66 is said to be moderate, while less than 0.19 is said to be weak. Based on Appendix 6, the R<sup>2</sup> value is 0.995, so it belongs to the good criteria.

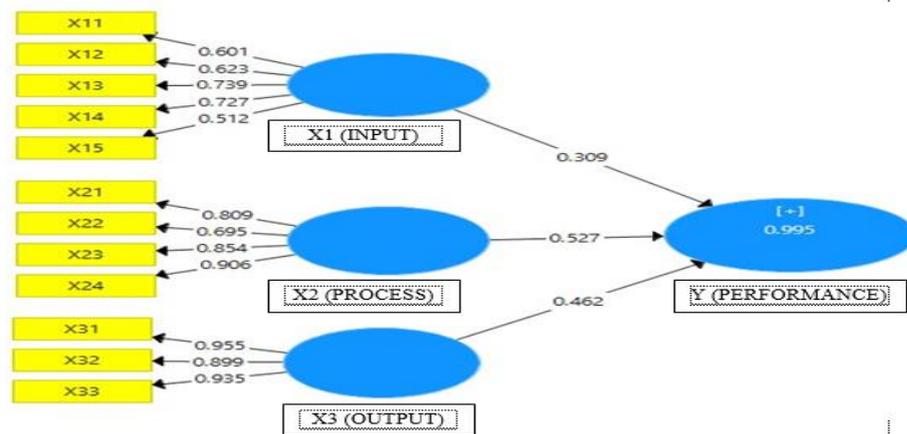


Figure 2. The Role of Each Indicator And Construct That Determines The Effectiveness Of The Agricultural Insurance Program In Bongkasa Village, Badung Regency

Based on the results of the discussion of confirmatory factor analysis described previously, Figure 2 shows that the first stage includes the effectiveness of inputs (X1): Program Target Accuracy (X15) with a value of 0.512 has the smallest contribution compared to other indicators in forming

input variables; while the Accuracy of Amount of Assistance (X13) with a value of 0.739 is an indicator that has the largest contribution compared to other indicators in forming input variables.

Process effectiveness (X2): Stakeholder Response Speed (X22) with a value of 0.695 is an indicator that has the smallest contribution compared to other indicators in forming process variables; while Evaluation (X24) with a value of 0.906 has the largest contribution compared to other indicators in forming process variables.

Output effectiveness (X3): Income increase with a value of 0.955 is an indicator that has the largest contribution compared to other indicators in forming output variables; and Increased Employment Opportunities (X32) with a value of 0.899 is the indicator that has the smallest contribution compared to other variables in forming the output variable. When viewed from all variables, the second stage is the input variable (X1) with a value of 0.309, the process variable (X2) with a value of 0.527 and the output variable (X3) with a value of 0.462. So the process variable has the greatest contribution to the agricultural insurance program in Bongkasa Village, Abiansemal Region, Badung Regency.

Farmers as insurance participants are required to implement technical recommendations or good agricultural management in carrying out their farming business, for example fertilizing plants using balanced fertilizers, so that in the event of crop failure insurance claims can be disbursed[21]. In this program, the premium rate and the insured value are assumed to be 3 (three) percent and Rp6.000.000 in one hectare during one growing season, so that the premium to be paid is Rp180.000 in one hectare during one growing season. While the maximum area of land that can be insured is 2 hectares. Claims will be paid in the event of crop failure with the criteria for damage to more than 75 percent of the insured agricultural land area. The insured value of Rp6.000.000 is considered to represent the average production cost[19]. While the franchise with a limit of 75 percent is set with a view to efficiency in handling claims and the assumption that damage below this percentage is considered to still provide sufficient results for smallholders[4]. The biggest cause of claims is due to flooding, while the other causes are pests and diseases (rats and blasts). The Ministry of Agriculture has formed a Consortium of Agricultural Insurance Guarantors with members of the Regional Government, farmer cooperatives and insurance companies[1]. The Ministry of Agriculture has also formed an agricultural community insurance working group in collaboration with PT Asuransi Jasindo to develop a broad-scale agricultural insurance system.

In an effort to develop sustainable agriculture, rice cultivation technology is a profitable integration of rice farming. Ecologically (environmentally friendly) integrated rice-fish farming technology is reviewed based on the aspect of developing agricultural land to become more fertile with the presence of fish manure which contains various nutrients, is able to reduce the use of inorganic fertilizers and pesticides (chemicals), and is able to reduce the possibility of crop failure due to the need for more intensive land management[12]. Meanwhile, from an economic point of view, through optimizing narrow land, namely integrating rice and fish cultivation, it is expected to reduce production costs, because fish manure can be used as organic fertilizer and pesticide and reduce rice pests and diseases, as well as being able to increase income two times[22]. from rice and fish production. The design of sustainable *subak* areas in urban areas implementing the Tri Hita Karana concept also plays a role in maintaining the balance of nature through *parhyangan*, *pawongan*, and *palemahan*. With the implementation of this concept, it is supposed to preserve *subak* through the green line, the growth of organic agriculture against sustainable agricultural development in urban areas[11].

The role of insurance companies in the framework of future financing partnerships in the growth of agricultural insurance requires the effectiveness of agricultural insurance to be integrated with other products and services received by farmers, such as training and counseling, timely

provision of production factors (seeds, fertilizers and fertilizers, pesticides) and efficient marketing channels for agricultural products[18]. The implementation of agricultural insurance in Indonesia has good prospects, several steps that need to be taken by the government are (1) increasing the allocation of funds for implementing agricultural insurance in the Indonesia's State Revenue and Expenditure Budget in stages, (2) preparing technical regulations which include regulating mandatory agricultural insurance participation, (3) encouraging The Financial Services Authority and insurance company associations in the context of developing agricultural insurance to provide easy licensing for committed private insurance companies, as well as providing training and capacity building funds, (4) assigning state-owned insurance companies as providers and distributors of agricultural insurance and acting as reinsurance institutions , (5) encouraging local governments that have agricultural centers to commit to advancing the agricultural sector by providing premium subsidy funds for the regional government portion in the Regional Revenue and Expenditure Budget, intensively socializing agricultural insurance programs, and facilitating every farmer and farmer group to provide become an insurance participant, (6) examine the integration of agricultural insurance programs with agricultural sector services received by farmers (subsidized fertilizer, subsidized seeds, and social assistance). The increasing market penetration indicates that agricultural insurance programs are increasingly prospective in Indonesia[3].

The results of the study indicate the process variable has the highest proportion in influencing the level of effectiveness of the Agricultural Insurance Program. In other words, the process variable has the greatest influence on the effectiveness of this program, which is then followed by the output variable and the input variable. In Figure two it can be seen that the process has the greatest contribution, which means that every government program is determined by the process, namely through mentoring/training/guidance, active stakeholder responses to monitoring and evaluation. When the process runs well, the program will produce good output. Mentoring/training/coaching to monitoring and evaluation is a necessity so that the objectives of this program can be achieved[6].

#### **4. Conclusion**

Several conclusions can be pulled as follows: First, the level of effectiveness of the agricultural insurance program as an attempt to develop sustainable agriculture in Bongkasa Village, Abiansemal Region, Badung Regency belongs to the effective criteria (81.75%). This can be seen in the indicators, among others: there are more opportunities to have working capital when there is a risk of crop failure. This is because the rice farming insurance program provides protection for farmers in diverting the possibility of crop failure due to pests, drought, and attacks by Integrated Pest Organisms. Second, the results of factor analysis show that the most influential variable on the effectiveness of the agricultural insurance program as an effort to develop sustainable agriculture in Bongkasa Village, Abiansemal Region, Badung Regency is the process variable, followed by the output variable and the input variable.

According to the conclusions above, several suggestions that can be put among others; First, although process variables generally have the highest influence, the indicators of stakeholder response to complaints have the smallest contribution to process variables. Thus the role of stakeholders is expected to be more active in disseminating the agricultural insurance program to anticipate problems in the production process, especially regarding the risk of crop failure as an effort to develop sustainable agriculture. The agricultural insurance program is expected to be able to increase market penetration, so that the increased enthusiasm of farmers in food crop production will have an impact on achieving regional and national food security targets, and can increase the

contribution of the agricultural sector to both the National Regional Gross Domestic Product and the Regional Gross Domestic Product.

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