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Analysis of Willing to Pay Program on Rice Business Insurance in Karawang Regency

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Abstract

This study aims to determine the level of farmer participation in the Rice Farming Business Insurance (AUTP) program, and to determine the estimated willingness of farmers to pay the AUTP premium in Karawang Regency and the factors that influence it. The sample in this study amounted to 100 people taken from two villages from two sub-districts, namely Kutapohaci Village in Ciampel District and LemahKarya Village in Tempuran District. Farmers in Karawang Regency are willing to pay the AUTP premium. There are 44% of respondent farmers who are willing to pay the AUTP premium, the average value of the willingness to pay the AUTP premium is IDR 42,480/ha/planting season, which is greater than the value of the AUTP self-help premium set by the current government, which is IDR 36,000/ha/season planting, with a WTP value of IDR 42,480/ha/MT. Farmers hope that there will also be an increase in claim benefits to IDR 7.080.000. Based on multiple regression analysis, the factors that influence the farmer's Willingness to Pay (WTP) value on the AUTP program are the variables of education, land area, land status and income (at the real level). 5 percent). Meanwhile, based on the results of the logit analysis, it is known that the factors that can increase the chances of farmers participating in the AUTP program independently by paying the AUTP premium are the WTP value and income.

Keywords: Willingness to Pay, Rice Farming Business Insurance, Contingent Valuation Method

1. Introduction

The agricultural sector is still one of the important sectors in the Indonesian economy. The agricultural sector is also still one of the largest contributors to employment in Indonesia. In the February 2018 period, the agricultural sector was able to absorb 38.7 million workers (30.45%) of the total workforce of 127 million people. The population of Indonesia continues to increase every year with a growth rate of 1.49% per year or about four million people increase per year (BKKBN, 2016). With an average per capita rice consumption of 84.8 kg/year (BPS, 2016), a significant increase in rice production is needed(Suryahadi et al., 2009; Khusaini, 2015; Anyaoha et al., 2018).

The Directorate General of Food Crops since 2008 has carried out the National Rice Improvement Program (P2BN) by improving the quality of the Integrated Crop Management Field School (SL-PTT) and the Special Efforts for Corn and Soybean Rice (UPSUS PAJALE) (Frasetya et al., 2019; Thorbun, 2015). Agricultural insurance shows the government's alignment in anticipating the risk of losses in farming. In accordance with the mandate of Law No. 19/2013, the Ministry of Agriculture conducted a trial of Rice Farming Business Insurance (AUTP) in 2012 to 2013. This trial involved several parties, namely fertilizer SOEs, farmers/gapoktan, insurance companies (PT Jasindo), and the Ministry of Agriculture. Agriculture. In this trial, the government provides a premium subsidy of 80%, which is Rp. 144,000, - and farmers pay a premium of 20%, which is IDR 36,000,-/ha, if the rice plant is damaged by 75% or more, the farmer will receive a claim of IDR 6,000,000. /Ha (Ambarawati et al., 2018; Amrawaty et al., 2021; Jatmiko et al., 2017).

The areas that are tested for the implementation of AUTP are rice center areas with a high level of vulnerability or risk. Phase I trials were carried out during the planting season from October 2012 to March 2013 in Karawang Regency, West Java, East Oku Regency, South Sumatra, Tuban Regency and Gresik Regency in East Java. Phase II trials were carried out in the planting season from October 2013 to March 2014. Phase II trials were conducted in the

provinces of South Sulawesi and East Java. Phase III trials were carried out in the planting season from November 2013 to April 2014(Fadhil et al., 2021).

The target for Kabupaten Karawang in the first trial was an area of 1,000 ha, but it was said to be unsuccessful because no farmers were interested in participating in agricultural insurance. in 2015 the government began implementing the AUTP program in 17 rice-producing provinces with a target of 1,000,000 ha of insured paddy fields. AUTP realization data as of December 2016 shows the AUTP program has been followed by 606,491.72 hectares of rice fields with a self-help premium of IDR 21.8 billion. This figure only reached about 60% of the target. Meanwhile, when compared to the total land area, rice fields in Indonesia which reach 4,819,525 hectares (Ministry of Agriculture, 2016) only reached 12.5 percent of the insured land area(Yanuarti et al., 2019; Dewi and Rahayu, 2018; Dwijayana and Prajanti, 2021).

The Deputy Commissioner for Supervision of the Non-Bank Financial Industry (DKPIKN) stated that many farmers are still reluctant to pay a premium of 20% of the total premium that has been set (Tehero and Aka, 2020). The Indonesian General Insurance Association (AAUI) also stated that agricultural insurance products are not in great demand by farmers in Indonesia. Premium of IDR 36.000,- the /ha/MT that must be paid is considered quite expensive by the farmers. Several reports that have been stated regarding the lack of community participation in the AUTP program are related to the lack of willingness to pay for the AUTP premium that has been set by the government(Mutaqin and Usami, 2019; Pane el al., 2021).

2. Methodology

2.1. Types and Sources of Research Data

The data used is secondary data. The secondary data recorded included survey results to farmers in Karawang Regency obtained from journals, general conditions of the research location, population conditions, economic conditions, land use area, rice production, state of food crops and other data relevant to the research objectives.

2.2. Data analysis

2.2.1. Analysis of Farmers' WTP Value of AUTP Premium

In order to find out the estimated WTP value of farmers, the Contingent Valuation Method is used to ask farmers how much they are willing to pay for the insurance benefits they will receive.

The stages are:

1) Build a hypothetical market
2) Generate/generate bid value (bid)
3) Calculating the average value of WTP

The average value of WTP is calculated using the following equation:

$$E\ WTP = \sum_{i=1}^{n} Wi\ (Pfi)$$

Where:

$E\ WT$: Estimated average WTP (Rp)
Wi : Value WTP to-i (Rp)
Pfi : Relative frequency to-i
i : Respondent to-i (i = 1, 2, . . , 100)
n : Number of WTP classes

(1) Agregasi data total WTP

Agregasi data total WTP didapatkan dengan menggunakan nilai rata-rata WTP yang dikalikan dengan jumlah populasi.

$$TWTP = EWTP.Ni$$

Where:

TWTP : Total WTP (Rp)
EWTP \: Estimated or average value of the respondent's WTP (Rp)
Ni : Total population of respondents (people)

2.2.2. Analysis of factors that influence the value of WTP

The factors that affect the WTP value of farmers on the AUTP premium were analyzed using multiple linear regression models. The regression model in this study:

$$WTPi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu i$$

Where:

$WTPi$	: WTP value of farmers (IDR)
X_1	: Age
X_2	: Education
X_3	: Land Area
X_4	: Land Status
X_5	: Farming Experience
X_6	: Number of Dependents
X_7	: Income per Month
μi	: Term of Error
β_0	: Regression Constant
$\beta_1, \beta_2, \beta_3, \dots, \beta_7$	: Regression Coefficient

2.3. Parameter Test

Statistical testing needs to be done to check the goodness of a model that has been made. The statistical test used is:

1) Classical Assumption Deviation Test.
   a. Normality Detect
   b. Multicollinearity Detect
   c. Heteroscedasticity Detection
2) Statistical Criteria Test
   a. Individual Parameter Significance Test (t Test)
   b. Simultaneous Significance Test (F Test)

2.3.1. Analysis of the factors that affect the chances of farmers' willingness to pay premium AUTP

Opportunity analysis can use Logit, Probit, or Tobit Models. Logit model is a non-linear regression model that produces an equation where the variable dependent is categorical. The most basic categories of the model produce binary values, such as the numbers 0 and 1. The resulting number represents a category certain results resulting from the calculation of the probability of the occurrence of that category. Shape the basis of probability in the logit model can be explained in the following Table 1.

Table 1. Probability in the Logit Model

Yi	Probability
0	$1 - Pi$
1	Pi
Total	1

The regression equation for the logit model is obtained from the derivation of the probability equations from the categories to be estimated. The probability equation:

$$\frac{Pi}{1-Pi} = \frac{1+e^{zi}}{1+e^{-zi}}$$

Furthermore, by applying the natural logarithm to the odds ratio, it will produce the following equation.

$$Li = \text{In } \frac{Pi}{1-Pi} = Zi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu i$$

Where:

Zi	: the probability that the farmer is willing to pay the AUTP premium
X_1	: Gender
X_2	: Marital Status
X_3	: WTP Value
X_4	: Income
X_5	: Expenses
X_6	: Socialization
X_7	: Funding Source
μi	: Term of Error
β_0	: Regression Constant
$\beta_1, \beta_2, \beta_3, \dots, \beta_7$	: Regression Coefficient

3. Results And Discussion

3.1. Farmers' Willingness to Pay Analysis of Rice Farming Insurance Premiums

This study was conducted to determine the willingness of farmers to pay premiums and the maximum amount that farmers are willing to pay to obtain insurance benefits from the Rice Farming Business Insurance (AUTP) program. WTP analysis in this study used the Contingent Valuation Method (CVM). The results of implementing the four steps of CVM in the study are as follows:

1) Formation of a Hypothetical Market
   All respondents were given information about the Rice Farmer Business Insurance (AUTP) program. Thus the respondent knows the description of the hypothetical situation regarding the cost of the AUTP premium.
2) Acquired Bid Value
   Respondents were asked repeatedly whether he wanted to pay a certain amount as a starting point, where the starting point was the current AUTP premium of IDR 36,000/ha/planting season. Questions are stopped until a fixed value is obtained.
3) Calculating the Estimated Average WTP
   Data distribution of respondents' PAPs can be seen in the Table 2.

Table 2. Respondent Data

No.	WTP Class (IDR)	Number of people	Percentage
1	36.000	58	58
2	45.000	24	24
3	54.000	10	10
4	63.000	4	4
5	72.000	4	4
Amount		100	100

4) Aggregate WTP or Total WTP
   Based on the calculation results, the total value of WTP from the respondent population is IDR 4,248,000.00

Tble 3. WTP Calculation Results

No.	WTP Class (IDR)	Number of people	Number of people	Total (IDR)
1	36.000	58	58	2.088.000
2	45.000	24	24	1.080.000
3	54.000	10	10	540.000
4	63.000	4	4	252.000
5	72.000	4	4	288.000
Amount		100	100	4.248.000

The results of the analysis show that the average maximum WTP value of respondent farmers to the AUTP premium in Karawang Regency is IDR 42,480/ha/planting season or 23.6% of the total premium of IDR 180,000/ha/planting season. When compared with the self-help premium set by the government, which is 20% of the total premium, it can be concluded that if the government changes its policy regarding AUTP premium assistance, the respondent farmers are willing and able to pay a premium of up to IDR 42,480/ha/planting season, with an estimated WTP of 42,480/ha/MT farmers hope that there will be an increase in claim benefits in the event of crop failure, which is IDR 7,080,000/ha/MT.

3.2. Analysis of Factors Affecting Farmers' WTP Value

Based on the multiple linear regression analysis performed, it can be seen that the equations of the multiple linear regression analysis model are as follows:

$$WTPi = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu i$$

Where:

WTPi	: WTP value of farmers (Rp)
X_1	: Age
X_2	: Education
X_3	: Land Area
X_4	: Land Status
X_5	: Farming Experience
X_6	: Number of Dependents
X_7	: Income per Month
μi	: Term of Error
β_0	: Regression Constant
$\beta_1, \beta_2, \beta_3, \dots, \beta_7$	: Regression Coefficient

So that the resulting prediction model will be BLUE (Best Linear Unbiased). Estimation), statistical testing is needed to check the goodness of a model which has been made.

a. Data Normality Test
   The test results show a significant value of 0.200 > 0.05 for WTP farmers against AUTP which means the data is normally distributed.
b. Multicollinearity Test
   The test results show the VIF of each variable has a value of less than 10 and the value of tolerance more than 0.1. This means that the regression equation model that is formed does not there is a correlation between the independent variables, so that the regression model can declared free from multicollinearity problems.
c. Heteroscedasticity Test
   The test results show that the sig (2-tailed) column has a value greater than alpha 5%, so that the regression equation does not occur heteroscedasticity.
d. Hypothesis Testing
   1. Coefficient of Determination Test (R)
      The statistical value of the coefficient of multiple determination (R) obtained from the estimation results is 0.796. This means that all independent variables can explain the dependent variable by 79.6%.
   2. F Uji test
      Based on the estimation results with the OLS method, the F test value is 0.000. This means that there is a significant effect between the independent variables (age, education, land area, land status, experience, farming, number of dependents, and income) together on the WTP value of farmers on the AUTP premium in Karawang Regency.
   3. T Uji test
      Based on the results of the classical assumption test and hypothesis testing, it can be concluded that the regression equation formed is as follows:

$$\boldsymbol{WTPi = 25866.989 - 98.793X_1 + 424.229X_2 - 1.110X_3 + 3345.695X_4 + 87.604X_5 + 568.997X_6 + 0.007X_7}$$

3.3. Logit Regression Analysis

In this study, the opportunity analysis model was used to determine the effect of the explanatory variables in determining the relative preference/opportunity for farmers to pay the AUTP premium.

$$Zi = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \mu i$$

Where:

Zi	: the probability that the farmer is willing to pay the AUTP premium
X_1	: Gender
X_2	: Marital Status
X_3	: WTP Value
X_4	: Income
X_5	: Expenses
X_6	: Socialization
X_7	: Funding Source
μi	: Term of Error
β_0	: Regression Constant
$\beta_1, \beta_2, \beta_3, \dots, \beta_7$	: Regression Coefficient

The steps of logit regression testing are:

1) Test the feasibility of the model before entering the explanatory variable

Table 4. Iteration Result

Iteration		***-2 Log likelihood***	***Coefficients***
			Constant
Step 0	1	137.186	-0.240
	2	137.186	-0.241
	3	137.186	-0.241

From the Chi-Square table, the value is 138,144, so -2 log likelihood < Chi-Square (137.186 < 138.144). The decision to accept 0, with the word other constants enter into the model.

2) Test the feasibility of the model by entering the explanatory variable

Table 5. Omnibus Test Results

		-2 Log likelihood	***df***	***Sig.***
Step 1	*Step*	99.197	7	.000
	Block	99.197	7	.000
	Model	99.197	7	.000

The output results above show that the significance value is 0.000 <0.05 so the model is feasible to use and has a 99% confidence level.

3) Coefficient of Determination

Table 6. Model results summary

Step	***-2 Log likelihood***	***Cox & Snell R Square***	***Nagelkerke R Square***
1	37.989	0.629	0.843

The results of the model summary show that the Nagelkerke R Square model is 84.3%, meaning that the diversity of variables (Zi) that can be explained by the model is 84.3%, while the rest is explained by other factors outside the model.

4) Model Classification

Table 7. Model Classification Accuracy

Observation		Prediction		
		Y_WTP		Percentage of accuracy
		Not willing to pay the AUTP premium	Willing to pay AUTP premium	
Y_WTP	Not paying premium	53	3	94.6
	Want to pay premium	4	40	90.9
Overall Percentage				93.0

Percentage of model accuracy in classifying respondents for willingness to pay premiums or not is 93%. This means that there are 93 out of 100 respondents the right classification with the logistic regression model.

5) Goodness of Fit Test

Table 8. Hosmer and Lemeshow test results

Step	*Chi-square*	df	Sig.
1	1.752	8	0.988

The test results show that the significance or p-value generated is 0.988 > 0.05 so that the model is sufficient to explain the empirical data

6) Partial Test

Partial testing using the Wald test to show the factors that affect the dependent variable (Zi).

Table 9. Wald Test Results

Variabel Penjelas	*B*	*S.E.*	*Wald*	*df*	*Sig.*	*Exp(B)*
X1_Jenis_kelamin	-0.501	0.981	0.261	1	0.610^{ns}	0.606
X2_Status_Pernikahan	0.014	1.920	0.000	1	0.994^{ns}	1.014
X3_Nilai_WTP	0.000	0.000	15.289	1	0.000^{**}	1.000
X4_Pendapatan	0.000	0.000	5.215	1	0.022^{*}	1.000
X5_Pengeluaran	0.000	0.000	0.960	1	0.327^{ns}	1.000
X6_Sosialisasi	0.338	0.994	0.116	1	0.734^{ns}	1.402
X7_Sumber_Pembiayaan	1.361	1.076	1.601	1	0.206^{ns}	3.901
Constant	-27.034	6.460	17.512	1	0.000	0.000

The results of the Wald test show that there are 2 dependent variables that significantly affect the willingness to pay the AUTP premium because it has a significance less than 0.1, namely the value of WTP and income. The result model for the substitution of the estimated coefficients is as follows.

$$Zi = -27.034 + .000X3 + .000X4$$

4. Conclusions and Recommendations

4.1. Conclusions

Based on the results of this study it can be concluded as follows:

1 Farmers in Karawang Regency are willing to pay the AUTP premium. There are 44% of respondent farmers who are willing to pay the AUTP premium, the average value of the willingness to pay the AUTP premium is IDR 42,480/ha/planting season, which is greater than the value of the AUTP self-help premium set by the current government, which is IDR 36,000/ha/planting season, with a WTP value of IDR 42,480/ha/MT, farmers hope that there will also be an increase in the claim benefit to IDR 7,080,000

2 Based on multiple regression analysis, the factors that influence the farmer's Willingness to Pay (WTP) value on the Rice Farming Insurance Program (AUTP) are the variables of education, land area, land status and income.

3 Based on the logit regression analysis, the factors that influence the farmer's opportunity to be willing to pay the AUTP premium are the WTP value and income variables.

4.2. Suggestion

Based on the results of the study, it is known that the factors that can increase the chances of farmers participating in the AUTP program independently by paying the AUTP premium are the WTP value and income. The WTP value expressed by farmers in this study is higher than the self-help premium determined by the government, it implies farmers' expectations that the government can increase the claim benefits that will be received by farmers if they experience crop failure to IDR 7,080,000/ha/planting season because of the claim benefits. The current government regulation, which is IDR 6,000,000/ha/planting season, is deemed insufficient and has not been able to cover the capital needed by farmers to start their farming again.

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