# The Attributes of Insurance Product as Determinant Factors of Coffee Farmers' Participation in Agricultural Insurance'

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**Abstract.** This research aimed to analyze the product attributes of agricultural insurance as determinant factors of coffee farmers' intention to participate in agricultural insurance. The product attributes are namely premium cost, insurance coverage, insurance requirements term, compensation value, and claim process. The research was conducted in Sumowono and Jambu District Semarang Regency of Central Java using survey method with 105 respondents in total. Binary Logistic Regression was used to analyze the research purpose. The result showed that the determinant factors were significantly influenced farmers' intention to participate in agricultural insurance, and respondents tend to choose participating in agricultural insurance despite the lack socialization process of agricultural insurance procedures before. This research underlined the importance of designing appropriate agricultural insurance scheme specifically related to premium cost and subsidy.

**Keywords:** Agricultural Insurance · Coffee Farmers · Participation Intention · Product Attributes

## 1 Introduction

Indonesia is the second largest coffee producing country in Southeast Asia and the fourth in the World after Brazil, Vietnam, and Colombia. USDA data stated that in 2019/20, Indonesia is at least able to produce 642,000 tons of coffee beans [1]. Coffee plantation area in Indonesia covers 1.25 million hectares with productivity reaching 513 kg of coffee bean/ hectares/ year. Therefore, it can contribute the country's foreign exchange income with the export value reaches US$ 809.16 million and thus making coffee as one of the main export plantation commodities of Indonesia [1].

Insurance is an agreement between two or more parties as one action to reduce the risk of losses that can occur, stated in the form of a policy where the determination of premium rates and insurance terms do not burden the insured and protect a number


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of vulnerable risks. Agricultural insurance is one of the strategies in agricultural risk management mechanisms. The purpose of agricultural insurance is to provide protection and easiness to bear the risk of farming, where the covered product is an agricultural product with a high level of risk [2].

Agricultural insurance is particularly important to help farmers from big losses and ensure that they will have sufficient working capital earned for insuring their farm business to finance farming activities for the following season. However, the awareness of farmers to participate in agricultural insurance is very weak [3], because they find it unacceptable to pay insurance costs incurred from losses that may not directly affect them. Hence, the affordability of agricultural insurance is a major factor in agricultural insurance decision making, whereby the adjustment of premiums that need to be paid can improve the demand for agricultural insurance [4].

Semarang Regency is one of the coffees producing regions in Central Java. Coffee production in Semarang Regency in 2020 reached 1,457.56 tons [5]. The selected districts are Sumowono and Jambu Districts as these are the top two coffee producing regions in Semarang Regency. Coffee production in Sumowono District in 2020 amounted to 670 tons or 45.97% of Semarang Regency coffee production meanwhile in Jambu District reached 533.92 tons or as much as 36.63% of coffee production in Semarang Regency [5]. In Vietnam, the implementation on the piloting of agriculture insurance for coffee trees contributed to achieving the objective of assisting farmers to overcome the impacts of and cover financial losses caused by natural calamities and epidemics, thus helping to ensure social wealth fare in rural areas and boosting up agricultural production [6].

It is important to involve farmers in the studies to provide valuable input for the development of agricultural insurance program. Previous research mainly focused on the social demographic and or farming factors [7–11] to evaluate the willingness of farmers to join agricultural insurance program. Meanwhile, from the discussion of product attributes, previous research found one of the reasons behind the low awareness and intention to participate on livestock insurance program is the premium cost [12, 13]. Therefore, study of consumer behavior related to the attributes of agricultural insurance products is important to conduct to give valuable insight in this research field. Hence, this paper aimed to analyze the insurance products attributes namely premium cost, insurance coverage, insurance requirements term, compensation value, and claim process as the determinant factors of coffee farmers' intention to participate in agricultural insurance program.

## 2 Research Methods

The research was conducted in September – October 2020 located in Sumowono and Jambu Districts, Semarang Regency, Central Java Province. Both locations were selected as they are the two biggest coffee producing districts in Semarang Regency. Survey method was used to collect information to answer the research questions by doing interview assisted with a questionnaire. The method of determining the location was conducted purposively because it has certain criteria.

The method used in determining the number of samples was based on the requirements specified by Hair [14] who stated that if the measurement model containing five

measurement variables, then the minimum number of samples taken amounted to 100 respondents. Furthermore, in order to meet the assumption of normality, the number of samples rounded off to 120 respondents using purposive sampling method. Followed by setting the quota of samples with the same amount in two districts; Sumowono and Jambu District respectively as many as 60 respondents, however only 105 respondents who will be analyzed further.

Data were collected by interviews using questionnaires. Interviews were conducted with coffee farmers from the selected district. Variables observed in the study include attributes of crop insurance namely premium cost, insurance coverage, insurance requirements term, compensation value, insurance claim process, and the dependent variable of participation intention of livestock insurance.

Data processing were conducted with the help of SPSS (Statistical Program for Social Science) then analyzed using Logit Regression Test. Logistic Model Analysis (LOGIT) is a further development of the linear probability model used to estimate the probability of a phenomenon by reducing the weaknesses found in the linear probability model. Some preliminary model tests namely Omnibus test, Pseudo R Square test, Hosmer and Lemeshow test, and Wald test performed before the Logit regression test. The Logit model also describes the probability of selecting one in a number of options available [15]. The Logit model equation:

$$Y = \ln\left(\frac{P}{(1-P)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu_i \qquad (1)$$

Explanation:
Y = 0; coffee farmers' intention not to participate in agricultural insurance
Y = 1; coffee farmers' intention to participate in agricultural insurance
P = Probability
β0 = Regression coefficient
β (1,2,3,4,5) = Variable coefficients
X1 = premium cost (score)
X2 = insurance coverage (score)
X3 = insurance requirements term (score)
X4 = compensation value (score)
X5 = claim process (score)
μ = error value

## 3 Results and Discussion

Based on the results of primary data collection using a questionnaire distributed to respondents, the characteristic of respondents in terms of age, income and length of gardening are presented in Table 1.

Table 1 describes that the majority of respondents are male with an age range between 40 - 49 years, showed that male is the dominant gender of coffee farmers. The results of the 2013 Agricultural Census of BPS [16] showed that 88.52% of farmers in Indonesia were male, while 11.48% were female farmers. More specifically, 83.09% of farmers working in the plantation sub-sector are male farmers, while 16.91% are female ones. On

**Table 1.** Distribution of Respondents' Characteristics (n = 105)

| No. | Characteristics | | Percentage (%) |
|---|---|---|---|
| 1 | Gender | Male | 88.57 |
| | | Female | 11.43 |
| 2 | Age (y.o.) | 20–29 | 3.81 |
| | | 30–39 | 15.24 |
| | | 40–49 | 52.38 |
| | | 50–59 | 26.67 |
| | | 60–69 | 1.90 |
| 3 | Monthly income (IDR) | <500,000 | 10.48 |
| | | 500,001–750,000 | 58.10 |
| | | 750,001–1,000,000 | 31.43 |
| 4 | Farming experience (year) | <3 | 4.76 |
| | | 3–10 | 54.29 |
| | | 10–20 | 27.62 |
| | | >20 | 13.33 |

average, the respondents are farmers who are at the productive age for work. According to BPS, the productive age of farmers is in the age range of 15 - 64 years. Productive age is the age at which someone is said to be able to work and earn income from work, such as farming. According to the results of the 2013 Agricultural Census by BPS [16], the productive age group dominates the number of agricultural business households as many as 20.49 million farmers or around 88.58% of the total number of farmers in Indonesia.

It also can be seen from Table 1 that the range of income earned by coffee farmers in one month is mostly around IDR 500,001 -750,000, while the length of time to cultivate coffee is between 3 - 10 years. This statistic shows that on average the respondents are farmers with relatively low income. BPS [17] stated that income is classified as low if it has an average monthly income of < IDR 1,500,000. Bärnighausen [18] suggested that many informal workers tend to use their income earned to meet their basic needs first before deciding to spend their money on many other things.

From Table 2, firstly we can interpretate that the value of Corrected Item-Total Correlation or r count for all variables have r count > r table (0.1918), which means that H0 is accepted and H1 is rejected, therefore it can be concluded that all the variables' data are valid. These results indicate that all the variables proposed for the logit regression test are correct / valid. According to Ghozali [19] data is said to be valid if the value of r count > r table is used to determine whether a data is valid or not.

Secondly, Table 2 displays that the Cronbach's Alpha value (of the reliability test) is 0.845, where the value is > 0.70 therefore H0 is rejected and H1 is accepted, so the overall data is reliable. These results indicate all the variables proposed for the logit

regression test are reliable. According to Ghozali [19] data is said to be reliable if the results of the Cronbach's Alpha statistical test bigger than 0.70.

The results of the Omnibus test (Table 2) submitted the Chi-square value of 16.724, bigger than the Chi-square table at df 5 = 11.07050 or with a significance of 0.005 < α 0.05 hence H0 is rejected and H1 is accepted, meaning that the addition of independent variables provide a significant influence on the model, or the independent variables simultaneously are a significant explanatory [20]. This is in accordance with the statement of Lomax and Hahs-Vaughn [15] which states that in the Omnibus F test, H0 is rejected if the significance value is less than the value α.

Meanwhile, the results of the Pseudo R Square test on the Nagelkerke R Square value of 0.197 indicates that the independent variables can explain the dependent variable by 0.197 or 19.7% and the rest are explained by any other factors outside the model. This number is too low, meaning that the explanation power of the independent variables in the model less than 50%. Lomax and Hahs-Vaughn [15] stated that the interpretation of the Pseudo R Square test results is the same as the multiple R Square on the OLS test where the results define the power of independent variables in explaining the dependent variable.

Furthermore, Table 2 also presents the results of the Hosmer and Lemeshow test that set out the calculated Chi Square Hosmer and Lemeshow value of 13.918 < 14.07 (the Chi Square table value for df = 7) and a significance value of 0.053 > α 0.05 therefore H0 is accepted and H1 is rejected, meaning that regression model test proposed is acceptable and there is no difference between the observation value and the regression model. This is in accordance with the statement of Lomax and Hahs-Vaughn [15] which states that the Hosmer and Lemeshow test aims to determine whether the proposed regression model is acceptable or not and there is no difference between the observation value and the regression model.

Next, the Wald test results (Table 2) show a significance value for the premium cost variable of 1.665 > α 0.05 therefore H0 is accepted and H1 is rejected, meaning that partially the premium cost variable does not influence the intention to participate in agricultural insurance. The significance value for insurance coverage variable is 0.743 > 0.05 therefore H0 is accepted and H1 is rejected, meaning that partially the insurance coverage variable does not affect the intention to participate in agricultural insurance. The significance value for the variable insurance requirements term is 0.859 > 0.05, so that H0 is accepted and H1 is rejected, meaning that partially the insurance requirements variable does not have an influence on the intention to participate in agricultural insurance. The significance value for the variable compensation value is 0.053 > 0.05 so that H0 is accepted and H1 is rejected, meaning that partially the variable compensation value does not have an influence on the intention to participate in agricultural insurance. The significance value for the claim process variable is 0.729 > 0.05 so that H0 is accepted and H1 is rejected, meaning that partially the claim process variable does not have an influence on the intention to participate in agricultural insurance.

Lomax and Hahs-Vaughn [15] stated that the Wald test is a statistical test used to determine the significance of the influence of the independent variables partially on the dependent variable. Although the result of Omnibus test found that all the independent variables simultaneously are a significant explanatory in the model, those variables

**Table 2.** Results of preliminary model test

| Test type | | Variable | Result |
|---|---|---|---|
| Validity | Corrected Item-Total Correlation | Premium cost | 0.651 |
| | | Insurance coverage | 0.601 |
| | | Insurance requirements term | 0.689 |
| | | Compensation value | 0.710 |
| | | Claim process | 0.768 |
| | | Intention to participate in agricultural insurance | 0.344 |
| Reliability | Cronbach's Alpha | | 0.845 |
| Omnibus test | Chi-square | | 16.724 |
| | Sig. | | 0.005 |
| Nagelkerke R Square | | | 0.197 |
| Hosmer and Lemeshow test | Chi-square | | 13.918 |
| | Sig. | | 0.053 |
| Wald test | Sig. | Premium cost | 0.139 |
| | | Insurance coverage | 0.743 |
| | | Insurance requirements term | 0.859 |
| | | Compensation value | 0.053 |
| | | Claim process | 0.729 |
| Odds ratio | Exp.(B) | Premium cost | 1.665 |
| | | Insurance coverage | 0.875 |
| | | Insurance requirements term | 0.939 |
| | | Compensation value | 2.158 |
| | | Claim process | 1.183 |
| Coefficients | B | Constant | -4.556 |
| | | Premium cost | 0.510 |
| | | Insurance coverage | -0.133 |
| | | Insurance requirements term | -0.063 |
| | | Compensation value | 0.769 |
| | | Claim process | 0.168 |

partially do not have any influence on the intention to participate in agricultural insurance. Hence, statistically the result of partial independent variable test was weak and could

not prevail which independent variable significantly influence the dependent variable in the model [20]. Therefore, Odd ratio were then used to define the probability of coffee farmers to participate or not participate in agricultural insurance.

Next from Table 2., the results of the Odds ratio interpretation show the value of Exp (B) for the variable premiums cost = 1.665, meaning that if the premium costs increase by 1 rupiah, the tendency to participate in agricultural insurance becomes 1.665 times higher. The value of Exp (B) for the insurance coverage variable is 0.875, meaning that if the insurance coverage increases by 1 point, the tendency to participate in agricultural insurance is 0.875 times higher. The value of Exp (B) for the variable insurance requirements term is 0.939, meaning that if the insurance requirements term increase by 1 point, the tendency to participate in agricultural insurance is 0.939 times higher. The value of Exp (B) for the variable compensation value is 2.158, meaning that if the compensation value by the insurance company increasing by 1 rupiah, the tendency to participate in agricultural insurance becomes 2.158 times higher. The Exp value (B) for the claim process variable is 2.183, meaning that if the claim process increases 1 time better, the tendency to follow agricultural insurance becomes 2.183 times higher. Hendayana [20] stated when the odds ratio is closer to zero, means a person's tendency to adopt technology is very small.

Lastly, based on the coefficients value from Table 2, the regression equation is as followed:

$$Y = \ln\left(\frac{P}{(1-P)}\right) = -4,556 + 0,510X1 - 0,133X2 - 0,063X3 + 0,769X4 - 0,168X5 + e$$

The coefficient value shows the relationship between the independent variable and the dependent variable. A positive coefficient indicates that an increase in one value of an independent variable, will increase the dependent variable as many as the coefficient value of the independent variable, which means that the opportunity to participate in agricultural insurance increasing [21].

Overall, the test results found that the equation model is valid, reliable, and feasible (goodness of fit are passed). However, its predictive power was weak. A good model will show a significant relationship between its independent variables and dependent variable and have a strong predictive ability [20].

Furthermore, the estimation of logistic regression parameters in this study is interpreted in three scenarios (Table 3). Firstly, if the respondents had their lowest rating scale, namely all independent variables (X1 – X5) are in a not at all important level (1 point); this lowest rating scenario has a 3.54% chance of joining agricultural insurance. Secondly, when the respondents gave the average (neutral) rating scale, namely all independent variables (X1 – X5) are in neutral level (3 point); this scenario has a 30.94% chance of joining agricultural insurance. Lastly, if the respondents gave their highest rating scale, namely all independent variables (X1 – X5) are in very important level (5 point); this highest rating scenario presented 84.54% chance of joining agricultural insurance.

The result shows that the probability value can be influenced by differences in the characteristics of different coffee farmers. Farmers in the first scenario with the lowest assessment of each insurance attribute had more chances of interest in taking insurance compared to the second and third pilots with higher assessments of agricultural insurance

**Table 3.** Estimation value of Logistic Regression Parameter in three different scenarios

| Variables | Variable name | Respondents' characteristic with | | |
|---|---|---|---|---|
| | | Lowest scale | Neutral scale | Highest scale |
| $X_1$ | Premium cost | Not at all important (1) | Neutral (3) | Very important (5) |
| $X_2$ | Insurance coverage | Not at all important (1) | Neutral (3) | Very important (5) |
| $X_3$ | Insurance requirements term | Not at all important (1) | Neutral (3) | Very important (5) |
| $X_4$ | Compensation value | Not at all important (1) | Neutral (3) | Very important (5) |
| $X_5$ | Claim process | Not at all important (1) | Neutral (3) | Very important (5) |
| Probability value | | 0.0354 | 0.3094 | 0.8454 |

**Table 4.** Classification Table

| Observed | | Predicted | | |
|---|---|---|---|---|
| | | Y | | Percentage Correct |
| | | Not participating Insurance Program | Participating Insurance Program | |
| | | ---respondents--- | | ---%--- |
| Y | Not participating Insurance Program | 27 | 21 | 56.2 |
| | Participating Insurance Program | 12 | 45 | 78.9 |
| Overall Percentage | | | | 68.6 |

attributes. The difference in probability also occurs in the second scenario and the third one, where the second scenario with the impact of each attribute shows a lower probability than the third one with the highest insurance for each attribute. Therefore, with the better assessment of the respondents, the probability for participating in agricultural insurance are also higher.

Table 4 displays there are 57 respondents who are willing to participate in agricultural insurance. Based on these results, 45 respondents are really willing to take agricultural insurance and 12 respondents who should not be willing to take agricultural insurance are willing to participate. The number of respondents who are not willing to participate in agricultural insurance is 48 people. Based on these results, 27 respondents are really unwilling to take agricultural insurance and 21 respondents should be willing to take agricultural insurance. Based on the logistic regression interpretation, it gives an overall

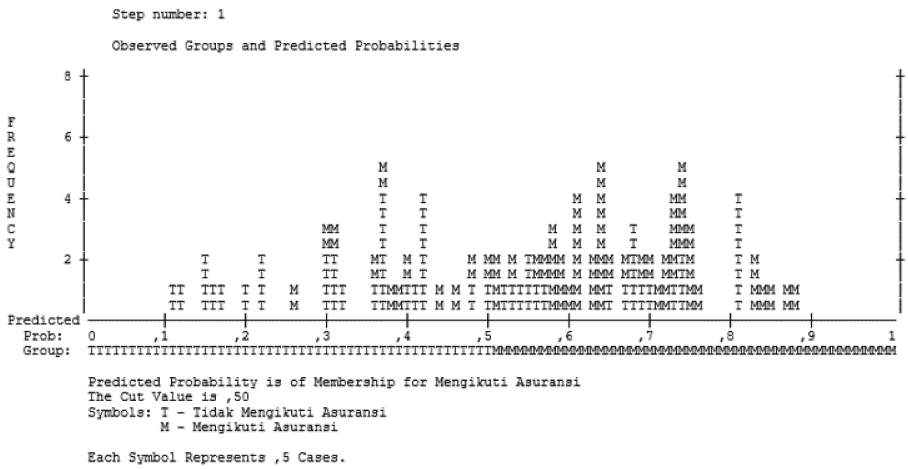


**Fig. 1.** Observed Groups and Predicted Probabilities

percentage value of 68.6%, which means that the accuracy of the model in this study is 68.6%.

The tendency of respondents in the decision to take agricultural insurance can be seen in the results of the Observed Groups and Predicted Probabilities of the proposed regression model as presented in Fig. 1 which shows that coffee farmers in Sumowono and Jambu sub-districts tend to take agricultural insurance. These results are in accordance with the results of research conducted by Sujarwo [22] which states that number of farmers in Malang Regency tend to choose to take agricultural insurance with the use of agricultural land, number of family members, previous experience in insurance participation, and the influence of farmer groups as influential actor. Meanwhile, based on the results of this research, it is found that coffee farmers in Sumowono and Jambu Districts tend to follow agricultural insurance based on the attributes of agricultural insurance product.

This research found a significant simultaneous effect of all insurance product attributes. However, this research failed to reveal the correlation power of product attributes to the participation since the partial effect found not significant. Future research should include more data and more variables in the model.

Previous studies found that farmers still have low awareness and limited information about insurance programs, so they are less interested in participating in insurance programs [13, 23]. Research of Marphy & Priminingtyas [24] located in Malang found that farmers are reluctant to participate in the Paddy Insurance (AUTP) program because they could not believe in insurance institutions. The membership registration process, surveys & claims process, and responses from insurance officers have not been able to convince farmers. Farmers also believe that they would not experience crop failure, so they feel reluctant to pay the premium cost [25]. This is certainly a challenge that will be faced if the insurance program is applied to coffee plants, especially so far in Indonesia there is still no insurance program applied to plantation (cash crop) commodities.

This research underlined the importance of premium cost as Suryanto [26] revealed that almost 94% farmers were not willing to pay for the crop insurance due to low willingness to pay for the premium cost. Furthermore, Safitri [27] found that farmers have a positive perception of affordable insurance premium and premium subsidies provided by the government. Farmers also have a positive perception and attitude towards the insurance coverage and claim process. The same studies also confirmed that premium subsidies are one of the factors that motivate farmers to participate in insurance programs.

Socialization activities regarding agricultural insurance are needed to increase knowledge of coffee farmers in terms of protecting their farming activities. In addition, socialization can also shape or change the attitude of coffee farmers towards agricultural insurance. Attitudes formed after receiving socialization about agricultural insurance can be a driving factor for coffee farmers to take agricultural insurance. The results of research conducted by Boer [28] regarding insurance as a protection guarantee stated that the socialization of climate index insurance is important to do to build farmers' comprehension of insurance and further clarify the insurance work system which can also open opportunities for improving cultivation in good climatic conditions and not only as a medium of protection from adverse climatic conditions. The following studies found a positive impact and emphasized the importance of disseminating information about insurance programs in increasing participation in agricultural insurance [24, 27, 29, 30].

## 4 Conclusion

Simultaneously, the attributes of agricultural insurance influence the interest in agricultural insurance adoption. The results of the Observed Groups and Predicted Probabilities showed that respondents tend to choose to participate in agricultural insurance even though there is no socialization regarding agricultural insurance.

Policymakers should conduct socialization about agricultural insurance to give coffee farmers a better knowledge and comprehension of agricultural insurance. Therefore, they can take decisions related to minimizing the risk of loss. It is important to design a proper agricultural insurance scheme, especially regarding the requirements term and premium cost and subsidies.

Future research agenda should consider to analyze the participation intention of coffee farmers towards agricultural insurance based on the attributes of the farmers such as land ownership area and the participation of coffee farmers in farmer groups since this study only focuses on the attributes of agricultural insurance product.

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