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ATTITUDE OF RICE FARMERS TOWARDS FARMS' CREDIT RISK

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ABSTRACT
This study aims to determine the perception of lowland rice farmers in facing the risk of farm credit and the factors that influence it. Simple random sampling method was applied to take 77 respondents from rice farmers. By using the "Bernoulli Utility Function" approach, farmers' perceptions of farm credit risk were analyzed. Simple regression analysis is used by performing a "risk coefficient aversion"(RCA) regression on the age of farmers and the size of rice farmers' land area owned by the farmers. The results of the analysis show that most of the rice farmers are risk averter to face the risk of farm credit as many as 38 (49.35%) respondents, 21 (27.27%) farmer respondents are risk neutral and as many as 18 (23.38%) respondents are risk seeking. The results of simple regression analysis show that there is a significant relationship between "RCA" with age of the farmer and the size of rice field owned by the farmers.

KEY WORDS
Lowland rice farmers, multi-utility function, risk aversion coefficient.

Increasing food production, especially rice, cannot be separated from improvements in cultivation technology. Technological improvements require improvements in the quantity and quality of production inputs which are adequate and appropriate for their use. So far, the increase in food production, especially rice, has been started since the beginning of independence, but due to some political reasons, the programs to increase rice production did not have significant results. Then at the end of the 1980s with the initiation of the Mass Guidance program (BIMAS), Mass Intensification (INMAS), INSUS (Special Intensification) and Super Special Intensification (SUPRA INSUS) gave significant results in increasing rice production which ended with the achievement of food self-sufficiency in the 1980s (Nuryanti, 2017; Wahyuni & Indraningsih, 2003).

The achievement of food self-sufficiency could not be maintained for various reasons. One of the reasons is the implementation of the intensification program requires the use of better cultivation technology at a higher cost. Even though in implementing the intensification program farmers are given the opportunity to take advantage of farm credit to finance the production process (Panekenan et al., 2017), not all farmers have succeeded in applying this intensification technology, because agricultural business itself is a risky business (Jankelova et al., 2017; Yanuarti et al., 2019). Many farmers fail in farming because of the dominant natural factors that do not support the plant cultivation process to run well. Failure to do farming by implementing an intensification program has had a significant impact on farmers. Thus, according to (Wati, 2015) these experiences of failure in farming tend to influence farmers' attitudes in utilizing farm credit.

There is not much information available to find out farmers' attitudes towards the risks of using farm credit (Saqib et al., 2016). This is evidenced by the lack of academic references in relation to farmer attitudes towards the risks of using farm credit. One of the obstacles is the lack of mastery of the right methodology to determine the attitude of farmers to the risks of using farm credit. This study provides an alternative methodology to determine farmers' attitudes towards the risks of using farm credit.

The lack of academic references regarding farmers' attitudes towards the risks of using farm credit is an obstacle to encouraging farmers to use farm credit (Hansson & Lagerkvist, 2012), (Gunes & Movassaghi, 2017). This is one of the sources of the inadequate distribution of farm credit to farming communities in order to support government programs, namely increasing agricultural production and increasing farmer household income.

The purpose of this study was to determine the attitude of farmers to the risks of using farm credit and to find out what factors influence farmers' attitudes towards the risks of using farm credit.

MATERIAL AND METHODS OF RESEARCH

Sampling was carried out in three stages: The first stage, the selection of research sites was carried out purposively with the consideration that Central Kupang sub District is one of the centers of lowland rice production in Kupang District. The second stage, purposive selection of sample villages with the consideration that Noelbaki Village is the village with the largest irrigated rice field in Central Kupang sub District. The third stage, the selection of sample farmers is done by simple random sampling using the formula of (Yamane, 1967). With a population of 95 farmers and an error rate of 5%, the number of samples obtained is 77 rice field farmers.

Knight (1921) was the first economist who formalized a distinction between risk and uncertainty. Knight meant risk is a situations in which one could assign probabilities to outcomes and uncertainty is a situations in which one could not (Langlois & Cosgel, 1993).

$$\frac{\textit{Probability events outcome are known}}{\textit{(Risky events)}} \ldots\ldots\ldots\ldots \frac{\textit{Probability events outcome are unknown}}{\textit{(Uncertain events)}}$$

Figure 1 – Definition of Risk and Uncertainty

In situations where there are risks and uncertainties, for a farmer the goal of farming is not merely to maximize profits but how they can achieve maximum satisfaction (use) of their farming (Semaoen, 1992) and (Girdžiūtė, 2012) states that the willingness of farmers to choose risk will basically depend on the psychological nature, satisfaction or utility received by farmers from the output.

Explaining the behavior of farmers in making decisions on risk, using the Bernoulli utility theory approach (The Bernoulli utility function) developed by (Lin et al., 1974), (Lins et al., 1981), (Collins & Gbur, 1991), (Stearns, 2000), (Quah, 2003), (Daza, 2004), (Mathews, 2004), (Charles-Cadogan, 2018).

The approach using Bernoulli's utility function requires 4 components in its analysis, namely (Wendt, 1970); (Albert, 1978) (Lewandowski, 2013):

- Action, is a choice of several alternatives from a set of actions presented to the decision maker. For example, farmers may decide to choose a business to grow soybeans, corn, rice or something else.
- State of nature, is a situation that can occur in relation to the choice of decisions from a set of existing actions. In this case the farmer is faced with two possibilities that will occur in connection with his business. Examples of rainfall that are sufficient for the growth of rice plants or vice versa, a long dry season that causes poor rice yields, a market atmosphere that is favorable for selling prices for farmers, or a market atmosphere that is not so good that it causes agricultural losses and others
- Occurence, is the chance of a state of nature which is stated by probability. For example, the probability that there will be sufficient rainfall when cultivating rice plants in the next growing season is 80%. The probability of the emergence of this state of nature can be based on an objective assessment (empirical with repeated experiments) or it can also be based on the subjectivity (experiences or references) of the decision maker. For the analysis of the Bernoulli utility function the probability value of an ordinary state of nature is 0.5 for the occurrence of an event and the event not occurring (mutually exclusive / mutually exclusive).

- Consequence/outcome, is the final result that is expected to be obtained from the selection of an action from a result of the interaction of choice on that action with the state of nature and probability. Consequences by (Wendt, 1970) should be in money term in oder to be able to compare one outcome with another. Schematically the four components of risky decision making can be shown as follows:

Actions/strategy (ai)	State of nature (climate)	
	Good	Poor
	Occurence	
	Ɵ1	Ɵ2
	Concequences/outcomes	
a1 (soybean)	c 11	c 12
a2 (rice)	c 21	c 22

Figure 2 – Risk Decision Making Component Scheme

(Anderson et al., 1977), (Backus et al., 1997), and (Hardaker et al., 2015) develop a technique called ELCE (Equally Likely Certainty Equivalent) to obtain the utility function of the farmer by making a series of questions to the farmer in such a way that the answer to the farmer as the decision maker is an indifference between the prospect of revenues that contains risk and a definite gain to get the expected utility function of the farmer is as follows:

Farmers are faced with the selection of two alternatives given between certain income (Certain Equivalent) and revenues that contain risks. Let's say that the farmer's gain from the risky revenues are an amount of IDR. X and IDR. Y with a probability of 50:50. and the definite income is IDR. Z. The IDR Z is an amount of money offered to farmers in varying amounts to the extent that the farmer is in an indifferent state to choose a definite income of IDR. Z with the amount of risky revenues, namely IDR. X and IDR. Y. If the exact amount of money IDR. Z has been obtained, it is then used in further questions.

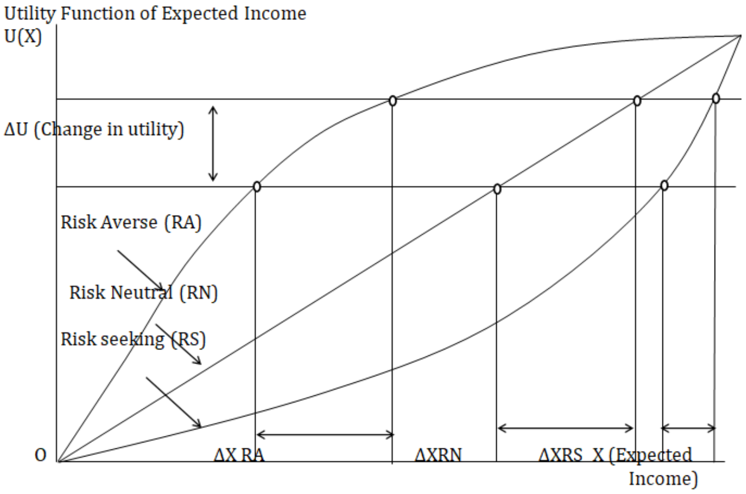

Figure 3 – Risk Seeking, Risk Neural and Risk Aversion

The expected utility function that resulted from ELCE subject to axioms as follows:

- ordering: a person is considered to prefer one of the two probability distributions, with the signs h1 and h2 of the consequences, or he is indifferent between the two, if any three distributions h1 is preferred over h2, and h2 is preferred over h3, then he must be prefers h1 to h3;
- continuity: if someone likes the probability distribution h1 rather than h2 and h2 rather than h3, then there must be a probability h in such a way that he indifference between h2 and a lottery with probability h gives the h1 distribution and the probability h gives the h1 and probability distribution (1-h) which results in the h3 distribution;
- independent: if h1 prefers h2, and h3 in some other distribution, then a lottery with h1 and h3 because the prize is preferable to a lottery with h2 and h3 with the prize, when the probabilities of h1 and h2 occur equally in both.

According to (Debertin, 2012) and (Semaoen, 1992) there are three types of utility functions, which are graphically depicted in Figure 3.

Figure provides an indication that:

- The utility function for "risk averse" or risk averse, slope of the curve, with decreasing increment as income increases;
- The utility function for risk neutral or risk neutral slopes of the curve is constant;
- The utility function for those who are "risk lover / seeking" or who dare to take risks, the slope of the curve will increase with increasing increase with increasing income.

The utility function model can be formulated in polynomial or quadratic form, because it can be differentiated to the second derivative. In the quadratic form it has been used by several previous authors such as (Dillon & Scadizzo, 1978), (Semaoen, 1992), (Saputra, 2020) (Lim & Lee, 2018) and (Ma Z., Shu J., 2020) namely:

$$U(X) = \alpha_1 X + \alpha_2 X^2 \quad (1)$$

Where: U (X) = utility from expected income; X = expected income at the point of indifference (rupiah's value from CE); α = coefficient of utility function.

According to (Lin et al., 1974) and (Officer & Halter, 1968) stated that the coefficient α_2 is the coefficient of "risk preference coefficient", as well as "risk aversion coefficient", which shows the reaction of farmer behavior to risk, namely, when:

- $\alpha_2 > 0$ means the decision maker has the courage to take the risk (risk seeking);
- $\alpha_2 > 0$ means the decision maker is reluctant to risk (risk averter);
- $\alpha_2 > 0$ means that the decision maker is risk neutral.

To find out whether lowland rice farmers are risk averse in using farm credit facilities, a quadratic usability function model is used with the following general model:

$$\mu(Y) = \alpha + \beta Y + \gamma Y^2 \quad (2)$$

Where: μ (Y) = Expected utility value; (Y) = Certain Equivalent; β,γ = Utility Cofficients; γ = Famers's Risk Coefficient Preference (RCP); if $\gamma > 0$ Risk Seeking (Risk Lover), $\gamma = 0$ Risk Neutral, and $\gamma < 0$ Risk Averter, (then the hypothesis which states that the low land rice farmers avoid the risk of using credit facilities is accepted).

To determine the impact of wealth and age towards the risk aversion coefficient of the farmers (RAC), simple linear regression was applied. Where the RAC as dependent variable, and age of the farmers and the size of low land rice field as independent variables respectively. The RAC is taken from equation 2.

$$|\gamma| = \theta + \delta_1 V_1 \quad (3)$$
$$|\gamma| = \theta + \delta_2 V_2 \quad (4)$$

Where: γ = *risk coefficient aversion (x 1000.0000 +1)*; V1 = age of the farmer (year); V2 = the size of land rice farm (Ha); θ = constanta; δi = regression coefficients for variables age and the size of low land rice field respectively; If the regression coefficients of δ is statistically significant, then the variables of farmer's age or the size of low land rice field has impact on *risk aversion coefficient* (RAC) or the hypothesis that state the farmer's age or the size of low land rice field affect the RCA is accepted.

RESULTS AND DISCUSSION

Obtaining the use value of farm credit for farmers is done by interviewing farmers based on a questionnaire that has been prepared in advance. The farmer is faced with the question of choosing a definite acquisition and acquisition that has risky prospects.

Acquisition that has a risky prospect is the amount of farm revenue obtained from multiplying physical output with the price. This revenue is the impact of implementing the recommended program package through farm financing sourced from farm credit, with a 50% chance of being successful in production; an acquisition of IDR. Y and the opportunity to fail in production is 50 to get IDR. X. Then the farmer is faced with a definite gain of IDR. Z which continues to change until the farmer is in an indifferent state to choose to use farm credit with the opportunity to get IDR. Y rupiahs if it succeeds in production, IDR. X rupiahs if it fails to produce and IDR. Z which is a definite gain. Then this question is repeated by combining a value of IDR. X, IDR. Y and IDR. Z to get the value of IDR. The new Z, say IDR. Z2 and so on.

As an example, it can be seen in Table 1, is the form of the question asked by one of the respondents of lowland rice farmers:

Table 1 – Example Simulation Questions to find out the Utility Value of Farm Credit

Simulation Questions	Fail Risk	Succeed Risk	Certain Equivalent
1	A 0,5 U (IDR. 0)	B 0,5 (IDR. 180.000)	C U (IDR. 150.000)
2	A 0,5 U (IDR. 0)	C U (IDR. 150.000)	D U (IDR. 148.000)
3	C U (IDR. 150.000)	B 0,5 (IDR. 180.000)	E U (IDR. 160.000)
4	A 0,5 U (IDR. 0)	D *U (IDR. 148.000)*	F U (IDR. 154.000)
5	D U (IDR. 148.000)	C U (IDR. 150.000)	G U (IDR. 149.000)
6	E U (IDR. 160.000)	B 0,5 (IDR. 180.000)	H U (IDR. 170.000)
7	C U (IDR. 150.000)	E U (IDR. 160.000)	I U (IDR. 155.000)

Then arbitrarily determined the utility value for U (IDR. 0) = 0 and U (IDR. 180,000 = 100. Then, by using interpolation, the utility value for the other revenue values can be determined as in Table 2.

The question model to obtain farm credit utility values for farmers is referred to from the “Bernoullian Utility” model developed by Semaoen (1992a) which is also basically the same as the model developed by Officer and Halter from the modification of the Ramsey model in Lin et al (1974). The regression estimation model used is a quadratic model. The determination of whether the farmer takes a rejecting, neutral or courageous attitude towards risk is seen from the value of the quadratic coefficient. If the value of the quadratic coefficient is significant negative, then the farmer can be classified as a risk averse group. And if the quadratic coefficient is significant, the farmer can be classified as a risk neutral group. Meanwhile, if the quadratic coefficient takes a positive and significant value, then the farmer can be classified as a risk-brave group.

Table 2 – Sequence of Questions for Obtaining a Definite Benefit Value Based on Risk Fail and Succeed

P-1	: U (IDR. 150.000)	= 0,5 U (IDR. 0)	+ 0,5 U (IDR. 180.000)
		= 0,5 (0)	+ 0,5 (100)
	U (IDR. 150.000)	= 50	
P-2	: U (IDR. 148.000)	= 0,5 U (IDR. 0)	+ 0,5 U (IDR. 150.000)
		= 0,5 (0)	+ 0,5 (50)
	U (IDR. 148.000)	= 25	
P-3	: U (IDR. 160.000)	= 0,5 U (IDR.150.000)	+ 0,5 U (IDR. 180.000)
		= 0,5 (50)	+ 0,5 (100)
	U (IDR. 160.000)	= 75	
P-4	: U (IDR. 145.000)	= 0,5 U (IDR. 0)	+ 0,5 U (IDR. 148.000)
		= 0,5 (0)	+ 0,5 (25)
	U (IDR. 145.000)	= 12,5	
P-5	: U (IDR. 149.000)	= 0,5 U (IDR. 150.000)	+ 0,5 U (IDR. 148.000)
		= 0,5 (50)	+ 0,5 (25)
	U (IDR. 149.000)	= 37,5	
P-6	: U (IDR. 170.000)	= 0,5 U (IDR. 160.000)	+ 0,5 U (IDR. 180.000)
		= 0,5 (75)	+ 0,5 (100)
	U (IDR. 170.000)	= 87,5	
P-7	: U (IDR. 155.000)	= 0,5 U (IDR. 150.000)	+ 0,5 U (IDR.160.000)
		= 0,5 (50)	+ 0,5 (75)
	U (IDR. 155.000)	= 62,5	

Table 3 – Number of Respondents Rice Farmers in Nolebaki Village In the 2020 Planting Season based on the attitude towards the risks of using agricultural credit

Attitude Farmers to Risk	Number of farmer	%
Risk Averter	38	49.35
Risk neutral	21	27.27
Risk Seeking	18	23.38
Total		100.00

Source: Analyzed Primer Data

The results of binomial testing to determine the proportion of farmers' attitudes towards the risk of using farm credit as a whole or per intensification group show that most farmers have a refusal attitude towards the risk of using farm credit.

Table 4 – Regression Analysis of RCA on Age of The farmer

Dependent Variable: RCA__X_1000_0000__1_
Method: Least Squares
Date: 11/24/20 Time: 07:35
Sample: 1 77
Included observations: 77

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.099084	0.007733	142.1253	0.0000
Farmers' Age	-0.002470	0.000165	-14.96254	0.0000

R-squared	0.749061	Mean dependent var	0.987516
Adjusted R-squared	0.745715	S.D. dependent var	0.035679
S.E. of regression	0.017992	Akaike info criterion	-5.172152
Sum squared resid	0.024278	Schwarz criterion	-5.111274
Log likelihood	201.1279	Hannan-Quinn criter.	-5.147802
F-statistic	223.8777	Durbin-Watson stat	1.962479
Prob(F-statistic)	0.000000		

Based on the test results to obtain the number of samples based on the category of farmers' attitudes towards the risk of using farm credit, it can be seen that most of the paddy rice farmers at Noelbaki Village are afraid of the risk (risk averter) of farming credit.

Table 5 – Regression Analysis of RCA on Rice Field Land Area

Dependent Variable: RCA__X_1000_0000__1_
Method: Least Squares
Date: 11/24/20 Time: 07:32
Sample: 1 77
Included observations: 77

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.957367	0.004198	228.0684	0.0000
The size of rice filed area	0.029011	0.003048	9.518260	0.0000

R-squared	0.547094	Mean dependent var	0.987516
Adjusted R-squared	0.541055	S.D. dependent var	0.035679
S.E. of regression	0.024171	Akaike info criterion	-4.581677
Sum squared resid	0.043819	Schwarz criterion	-4.520799
Log likelihood	178.3946	Hannan-Quinn criter.	-4.557326
F-statistic	90.59728	Durbin-Watson stat	1.926710
Prob(F-statistic)	0.000000		

To see the relationship between the level of farmer's ability to take risks as measured by the value of the risk coefficient with the factors that affect the ability to take these risks. The factors that affect the ability to take risks are specified as variables of age and level of wealth which are proxied based on the area of lowland rice farming. The results of regression analysis between the variables of farmer's age and the risk coefficient indicate that the age variable has an effect on the risk coefficient. This result is suppoted by the study of (Harrison et al., 2007; Ullah et al., 2015;Velandia et al., 2015). With the influence of the age variable on the risk coefficient, it means that the assumption that the higher the age of a person is the more reluctant that person is to bear the risk can be applied to the case of lowland rice farmers in Noelbaki Village. The results of the regression analysis can be seen in Table 4.

The results of the regression analysis between the risk coefficient and the land area variable were statistically significant. It means that the wealth of the farmers that was approached by the land area variable has a positive effect on the risk coefficient. Or in other words, the greater the wealth owned by farmers the more courageous the farmers are to take risks in the use of farming credit. The same indication is obtained from the results of (Harrison et al., 2007; Ullah et al., 2015;Velandia et al., 2015). (Lucas & Pabuayon, 2011), (Kisaka-Lwayo & Obi, 2012).The results of the regression analysis between the risk coefficient and the area of lowland rice farming can be seen in Table 5.

CONCLUSION

The longer the lowland rice farmer's age, the lower the farmer takes the risk of farming credit. The greater the level of wealth estimated by the variable of land area, the greater the ability of farmers to dare to take risks using farm credit.

Suggestions can be made to classify farmers based on their ability to take risks that can be approached by knowing the age of the farmers and the amount of farmer wealth proxied through the area of lowland rice farming. With the classification of farmers based on the ability of farmers to take risks, it will be easier to implement programs related to the development of lowland rice farming.

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