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Preparation Training for the Implementation of Agricultural Micro Insurance in the Prosperous Farmers Group, Parungponteng Village, Tasikmalaya Regency, Indonesia

Yuyun Hidayat[1*], Sukono[2], Titi Purwandari[3]

[1,3]*Department of Statistics, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, Indonesia*
[2]*Department of Mathematics, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, Indonesia*

**Corresponding author email: yuyun.hidayat@unpad.ac.id*

Abstract

Agriculture is a form of processing biological natural resources with the help of technology, capital, labor, and management. In Indonesia, agriculture is the main source of livelihood in some areas, one of which is Cibungur village, Parungponteng sub-district, Tasikmalaya district, West Java. With agriculture as the main livelihood in the village, all of these are not spared from the risks that can damage the agricultural sector. With the risks that can occur, there comes a solution to this problem, one of which is insurance. One of the insurance facilities for handling farmer risk is the Agricultural Micro Insurance program, which is expected to provide protection against the risk of uncertainty by providing guarantees for farmers to get working capital for farming from insurance claims. With this insurance, it can also reduce the risks that will occur which may be detrimental in the future. To realize this micro-insurance, we provide guidance to the prosperous farmer cooperative groups to form micro-insurance within the cooperative. It is hoped that the farming community will understand and be willing to participate in the agricultural insurance program promoted by the government.

Keywords: Agriculture, Risk, Insurance, Cooperative

1. Introduction

The agricultural sector in Indonesia has a strategic role in national development (Hayati et al., 2017; Kusumaningrum, 2019). The strategic role of the agricultural sector for economic growth includes: as a source of income for more than 70% of Indonesia's population, providing food for the Indonesian population, generating foreign exchange through exports, providing industrial raw materials, increasing employment and business opportunities, increasing Gross Regional Income, alleviating poverty. , and improvement of agricultural human resources through Agricultural Extension activities (Bembok et al., 2020; Wardani et al., 2020). On the other hand, efforts to achieve food self-sufficiency targets from agriculture are faced with the risk of uncertainty as a result of the negative impacts of climate change and other disasters that harm farmers (Pasaribu et al., 2016; Reyes et al., 2017; Hasanabadizadeh et al., 2019).

The impact of farmers' losses has made the government seek farm protection in the form of agricultural insurance, as stated in Law No. 19 of 2013 concerning Protection and Empowerment of Farmers, which has been followed up with the issuance of Minister of Agriculture Regulation No. 40 of 2015 concerning Facilitation of Agricultural Insurance (Septian et al., 2014; Vandawati et al., 2019).

One of the insurance facilities for handling farmer risk is the Agricultural Micro Insurance program, which is expected to provide protection against the risk of uncertainty by providing guarantees for farmers to get working capital for farming from insurance claims (Churcill et al., 2012; Zhang et al., 2015; Badina et al., 2020). Augustine and Adesunkanmi (2018) conducted an evaluation of the use of products from Agricultural Microinsurance for farming communities, by investigating how microinsurance policies have affected the peace of mind among farmers in Nigeria. Research concludes that microinsurance can reduce vulnerability among farmers in Nigeria. Proof of the benefits of micro insurance can also be seen with its compact products with affordable premiums and easy to implement for the wider community (Heenkenda et al., 2016; Rimawati et al., 2019). But in reality such agricultural insurance programs have not reached and have not been accessed by some farmers who live in remote areas, one of which is Parungponteng Village, Tasikmalaya Regency.

Therefore, we as academics intend to provide training on the preparation for implementing agricultural micro insurance through Community Service (PPM). The materials that will be provided in PPM activities are related to the preparation and management of the agricultural micro-insurance program. This material will be given at training sessions to both prosperous farmer groups and the local community in Parungponteng Village, Tasikmalaya Regency.

2. Literature Review

2.1 Risk of Crop Failure

The production potential of an agriculture is often threatened with yield loss (harvest failure) from Plant Pest Organisms (OPT), natural disasters (floods and droughts, volcanic eruptions) and post-harvest treatment that is not optimal. So, crop failure is a condition where farmers do not succeed or cannot reap the results of their fields or fields (Vandawai et al., 2019; Hayati et al., 2017).

2.2 Agricultural Microinsurance

Agricultural Insurance is a risk transfer that can provide compensation due to farming losses so that the sustainability of farming can be guaranteed. Agricultural insurance is a key component of risk management that farmers can use in conjunction with climate information to optimize their risk-return characteristics. Farmers face climate and market risks that are beyond their control (Churchill and Matul, 2012; Zhang et al., 2015).

Microinsurance is an insurance product for low-income people, where this insurance is packaged in simple features and administrative processes, is easy to obtain, at an economical price and is able to provide settlement of compensation as quickly as possible. The majority of farmers are part of low-income communities, so agricultural insurance applies the principle of microinsurance (Augustine et al., 2018; Heenkenda, 2016; Rimawati et al., 2019).

2.3 Agricultural Insurance Product Design

Product design is creating a new product for a business to sell to its customers. A very broad coefficient and effective generation and development of ideas through processes that lead to new products. The design of agricultural insurance products is to create new products as a means for farmers who experience depression and death of livestock to get back up to start their businesses. Insurance that runs well will provide protection to farmers and ranchers (Rimawati et al., 2019; Akgul et al., 2016; Alligod et al., 1996).

2.4 Mathematical Model for Determining Agricultural Insurance Premiums

2.4.1 Agricultural insurance premium calculation model normal curve method

The normal curve method is to calculate agricultural insurance premiums using the help of a normal distribution curve. This method is used because the frequency distribution of rice productivity is assumed to be normally distributed. This method assumes the coefficient of variance parameter value is 0.25 or 25% of the average parameter value.

In the normal curve method with coverage level C ($0 < C < 1$), rice productivity Y normally distributed with mean μ and variance σ^2. Compensation I for yield Y less than coverage level C can be written as:

$$I = \begin{cases} C\mu - Y & ; Y \leq C\mu \\ 0 & ; Y \geq C\mu \end{cases}. \quad (1)$$

Figure 1, shows the relationship between yields and compensation.

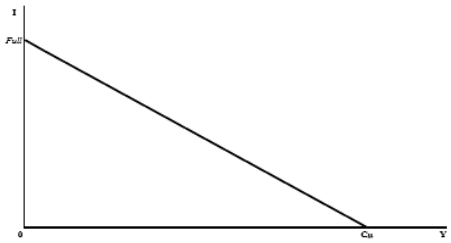

Figure 1: Relationship between crop yields and compensation

The compensation above can be calculated using the equation:

$$E(I) = \left[E(C\mu - Y \mid Y \leq C\mu\right]\left[P(Y \leq C\mu)\right]$$

$$= \left[C\mu - \left(\mu - \sigma \frac{\phi\left(\frac{C\mu-\mu}{\sigma}\right)}{\phi\left(\frac{C\mu-\mu}{\sigma}\right)} \right) \right] \left[\phi\left(\frac{C\mu-\mu}{\sigma}\right) \right]$$

$$= \left[\phi\left(\frac{C\mu-\mu}{\sigma}\right) \right](C\mu-\mu) + \left[\phi\left(\frac{C\mu-\mu}{\sigma}\right) \right](\sigma) \quad . \tag{2}$$

Equation (2) is used to calculate the premium of the normal curve method, so it is written:

$$\textbf{\textit{PREMIUM}} = \left[\phi\left(\frac{C\mu-\mu}{\sigma}\right) \right](C\mu-\mu) + \left[\phi\left(\frac{C\mu-\mu}{\sigma}\right) \right](\sigma) \quad . \tag{3}$$

2.4.2 Black-Scholes Method

The Black-Scholes method is one method that can be used to determine the amount of premium. According to Pramanik & Pappula and Pongpullponsak, the Black-Scholes model has similarities:

$$C(S,t) = Se^{-\delta t}N(d_1) - Ke^{-rt}N(d_2) \tag{4}$$

$$P(S,t) = Ke^{-rt}N(-d_2) - Se^{-\delta t}N(-d_1) \tag{5}$$

with

$$d_1 = \frac{\ln\left(\frac{Se^{-\delta t}}{Ke^{-rt}}\right) + (0.5\sigma^2)t}{\sigma\sqrt{t}} = \frac{\ln\left(\frac{S}{K}\right) + \left(r + \delta + 0.5\sigma^2\right)t}{\sigma\sqrt{t}} \quad , \tag{6}$$

$$d_2 = \frac{\ln\left(\frac{Se^{-\delta t}}{Ke^{-rt}}\right) + (0.5\sigma^2)t}{\sigma\sqrt{t}} = \frac{\ln\left(\frac{S}{K}\right) + \left(r - \delta + 0.5\sigma^2\right)t}{\sigma\sqrt{t}} \tag{7}$$

Where :

$C(S,t)$: call option price,

$P(S,t)$: put option price,

S : initial stock price,

K : Option strike price,

r : annual risk-free interest rate,

μ : deviation rate S, annualized,

σ : standard deviation of stock movement,

t : time (in years),

δ : dividend rate (stock gain),

$N(x)$: standard normal cumulative distribution function.

There are several similarities between option pricing and index insurance. Therefore, the index insurance premium amount can be determined the same as the option price. Determining the price of index insurance using the Black-Scholes method, can consider the following:

- Benchmark value on index insurance is R_T,
- The payment structure in index insurance is one-time,,
- The index follows a lognormal distribution.

By analogizing equation (7), the amount of agricultural insurance premiums can be calculated by first finding the cumulative distribution value d_2 with the equation:

$$d_2 = \frac{\ln\left(\frac{R_0}{R_T}\right) + \left(r - \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}, \quad (8)$$

With :

R_0 : latest rainfall value,

R_T : benchmark value (precipitation at time t selected as index),

σ : standard deviation of precipitation,

r : risk free interest rate,

t : time (in years).

For insurance based on the rainfall index, the amount insured (Payout) depends on the realization of rainfall and is designed as a put option, defined as:

$$Payout = \begin{cases} K, & IF\ R < R_T \\ 0, & OTHERS \end{cases}, \quad (9)$$

where K : insurance coverage for farmers due to changes in rainfall, R : latest rainfall index, R_T : the benchmark value of the rainfall index. Thus, the amount of agricultural insurance premiums based on the rainfall index can be calculated using the equation:

$$PREMIUM = Ke^{-r\rightleftarrows t}N(-d_2), \quad (10)$$

with

$N(-d_2)$: probability of rainfall less than the rainfall benchmark value,

r : continuous compound interest over time t.

2.4.3 Model for calculating the value of agricultural insurance reserves

There are several methods of calculating premium reserves (*Unearned Premium Reserve*). In this study, the 1/24 method was used, where each policy was issued at the beginning and middle of each month. Because using the 1/24 method, it is necessary to convert the amount of premium per one planting period to per half month. An average planting season is about 4 months, then the premium reserve value is searched with the equation:

$$UPR = P_0 \cdot F(t) \cdot (1-k), \quad (11)$$

with P_0: premium amount,$F(t)$: time distribution, and K = 1/24 (Ariyanti & Irianingsih, 2020).

2.5 Farmer's Community (Group)

Farmer groups are several farmers or breeders who gather themselves in a group because they have the same goals, motives, and interests. Farmer groups are the main actors in rural development. Farmer groups can play single or multiple roles, such as providing inputs for farming, providing irrigation water, providing capital, providing information, and collectively marketing the produce. The role of the farmer group is a description of the activities of the farmer group which is managed based on the approval of its members. These activities can be based on the type of business, or elements of the agribusiness subsystem, such as procurement of production facilities, marketing, and so on (Hayati et al., 2017; Kusumaningrum, 2019; Bembok et al., 2019).

3. Materials and Methods

3.1. Materials

The implementation of PPM activities is planned to be carried out in Parungponten village, Cibungur sub-district. This PPM activity is also aimed at the community in Parungponten village, Cibungur sub-district, Tasikmalaya district, West Java as well as providing material on micro insurance and agricultural cooperatives to prosperous farmer groups in Parungpoteng village. The preparation training for the implementation of agricultural micro insurance was given to the Prosperous Farmers Group in Parungponteng Village, Tasikmalaya Regency, because at this location research is also being carried out regarding the design of agricultural insurance products.

3.2. Methods

The method used in this PPM is a Practical Qualitative method which means that the results of intra-campus research can be applied to the community directly and practically. The understanding given is more on qualitative approaches such as discussion, consultation, and joint evaluation. However, in the workshop and training sessions for local prosperous farmer groups, a few quantitative explanations were given regarding the strategy for implementing agricultural micro-insurance. Implementation of training activities in an effort to prepare for the implementation of agricultural micro insurance, through the following stages:

a). Conduct field observations

b). Administration of permits to the Village Office, in Parungponteng Village, Tasikmalaya Regency as well as requests to involve local prosperous farmer groups in the implementation of activities.

c). Implementation of activities by providing training materials:

- Factors and risks of crop failure in agriculture.
- Systematics of agricultural microinsurance and its application to farmer groups.
- Strategies for implementing agricultural micro insurance that are in accordance with the needs of prosperous farmer groups in Parungponteng Village, Tasikmalaya Regency.
- Evaluation of training results

4. Results and Discussion

4.1 Cooperative Formation Activities Tani Sejahtera

a. Results of the discussion overview

- Foundation

  Cooperatives as a people's economic movement as well as business entities participate in realizing an advanced, just and prosperous society based on Pancasila and the 1945 Constitution in the national economic system which is structured as a joint effort based on the principles of kinship and economic democracy.

  On the basis of the above, we/citizens of the Tasikmalaya district government agreed to form a cooperative organization TANI SEJAHTERA in order to realize the welfare of members and the local community. The Tasikmalaya TANI SEJAHTERA Cooperative was founded on the basis of Pancasila and the 1945 Constitution and is based on the family principle.

- Organizational structure

Cooperative Name	: TANI SEJAHTERA
Address	: Kp. Panagan, Desa Cibungur, Kec. Parungponteng, Kab. Tasikmalaya, Jawa Barat
Ward	: Cibungur
Subdistrict	: Parungponteng
Regency	: Tasikmalaya
Province	: Jawa Barat
Chairman	: Cece Mubarok
Secretary	: Fahmi Sidiq
Treasurer	: Ika Kamilah
Supervisor 1	: Dadang
Supervisor 2	: Sihabudin Romdoni
Supervisor 3	: Ika Kamilah
Members	: 20 orang

- Capital
    1. Principal deposit IDR. 1.000.000 /member
    2. Mandatory savings IDR.100.000,- /month
    3. In an effort to improve services and expand business, they also seek loan capital from outside, namely:
        1) From members
        2) From banks and other financial institutions that are not burdensome
        3) From other cooperatives
        4) Issuance of bonds and other debt securities (participation capital)
        5) Total Participating Capital can be collected as much as Rp. 25,000,000, - to total assets.
- Remaining Business Results (SHU) Sharing

    The remaining operating results obtained, the distribution is regulated as follows :

a. 20 % (*twenty persen*) : Reserve
b. 50 % (*fifty persen*) : For members according to the comparison of their services in the cooperative business to obtain the company's residual income.
c. 15 % (*fiveteen belas persen*) : For organization funds
d. 5 % (*five persen* : For administration fees
e. 5 % (*five persen*) : For Development & Work Area
f. 5 % (*five persen*) : For social funds

b. TANI SEJAHTERA Participant Table 1.

Table 1: List of participants

No	Name	Address	Profesion	Position
1	Cece Mubarok	Kp. Cipicung	Self-employed	Chairman
2	Dadang	Kp. Cipicung	Retired	Supervisor
3	Ika Kamilah	Kp. Panagan	Housewife	Treasurry
4	Dayu Risnandar	Kp. Benteli	Not Yet/ Not Working	Supervisor
5	Fahmi Sidiq	Kp. Cipicung	Not Yet/ Not Working	Secretary
6	Sihabudin Romdoni	Kp. Cipicung	Not Yet/ Not Working	Supervisor
7	Tati Srimulyati	Kp. Panagan	Housewife	Member
8	Majid	Kp. Benteli	Farmer	Member
9	Aroh Romlah	Kp. Sukasirna	Housewife	Member
10	Rahmat Sumadireja	Kp. Cipicung	Self-employed	Member
11	Muslihah	Kp. Panagan	Housewife	Member
12	Jenab	Kp. Putat	Housewife	Member
13	Andri	Kp. Cibungur	Self-employed	Member
14	Idah Saidah	Kp. Panagan	Housewife	Member
15	Suherman	Kp. Putat	Farmer	Member
16	Iwan Sutiawan	Kp. Cipicung	Self-employed	Member
17	Lilis Suryamah	Kp. Panagan	Housewife	Member
18	Candra Wulan	Kp. Putat	Housewife	Member
19	Hamid	Kp. Panagan	Self-employed	Member
20	Ita Purnamasari	Kp. Panagan	Housewife	Member

c. Value Data

The data we use is data from the results of the pretest scores that we gave before the socialization activities and the post-tests that we gave after the socialization activities. Value data before and after socialization using power point media can be seen in the Table 2.

Table 2: Scores of Pre Test and Post Test

No	Name	*pre test*			*post test*		
		Correct	Wrong	Score	Correct	Wrong	Score
1	Cece Mubarok	7	3	70	7	3	70
2	Dadang	8	2	80	8	2	80
3	Ika Kamilah	7	3	70	8	2	80
4	Dayu Risnandar	6	4	60	8	2	80
5	Fahmi Sidiq	5	5	50	6	4	60
6	Sihabudin Romdoni	8	2	80	8	2	80
7	Tati Srimulyati	8	2	80	8	2	80
8	Majid	7	3	70	8	2	80
9	Aroh Romlah	7	3	70	7	3	70
10	Rahmat Sumadireja	7	3	70	8	2	80
11	Muslihah	7	3	70	7	3	70
12	Jenab	9	1	90	9	1	90
13	Andri	5	5	50	5	5	50
14	Idah Saidah	7	3	70	7	3	70
15	Suherman	8	2	80	8	2	80
16	Iwan Sutiawan	6	4	60	6	4	60
17	Lilis Suryamah	8	2	80	8	2	80
18	Candra Wulan	7	3	70	7	3	70
19	Hamid	8	2	80	8	2	80
20	Ita Purnamasari	7	3	70	8	2	80

d. Average knowledge of the sample

The average distribution of students' knowledge about natural disaster mitigation both before and after being given exposure using power point media can be seen in the following Table 3.

Table 3: Average Knowledge Value of Sample Before and After Socialization

Average	***Pretest***	***Post test***
	71	74.5

e. Knowledge level

The frequency distribution of public knowledge about disaster mitigation both before and after being given exposure using power point media can be seen in the following Table 4.

Table 4: Frequency Distribution of Sample Knowledge Before and After Socialization Using Power Point Media

Knowledge	***Pretest***		***Post test***	
	N	%	N	%
Good	17	85%	18	90%
Not Good	3	15%	2	10%
Amount	20	100%	20	100%

The results of this study can be categorized as good if the sample has a value greater than or equal to 60 and not good if the sample has a value less than 60. Based on the calculation of the results of the pretest, before socialization there were 17 or about 85% had good knowledge and as many as 3 or about 15% have poor knowledge. However, after socialization, according to the calculation of the post-test results, those with good knowledge increased to 18 or about 90%, while those with poor knowledge increased to 2 or about 10%.

In the training socialization program and preparation for the establishment of the Tani Sejahtera cooperative, Parungponteng sub-district, Tasikmalaya district, activity implementers who are members of the research working group and together with field supervisors conduct socialization with power point media. This activity is expected to have a positive impact on the surrounding community both in the short and long term.

This program is one of the efforts to improve the agricultural sector in the village. This program is carried out in one activity which is divided into several stages. These stages are as follows:

1. *Pretest*: Before the presentation was given, the people of Parungponteng village were given a pretest question to find out what they knew about Microinsurance.
2. Socialization: This socialization is done by explaining the material through power point media given by students. The material given is about Micro Insurance and the establishment of a prosperous farmer cooperative. This activity is followed by a rest session so that the local community does not get bored which is then followed by a question and answer session.
3. *Post-test*: *post-test* carried out after the presentation of the material and a break which aims to measure public understanding after the presentation of the application material is carried out. Basically, the post-test questions are the same as the pre-test questions.
4. After the activities were carried out, there was the provision of placards to the local village head and the provision of capital to the prosperous farmer cooperatives in Cibungur Village, Parungponteng District, Tasikmalaya Regency, West Java as the last agenda in this socialization program.Achievements in this program can be seen quantitatively, namely based on the difference between pretest and post-test.
    - Name of activity: Socialization of **Training For The Implementation Of Agricultural Micro Insurance At Prosper Farmer Group, Parungponteng Village, Tasikmalaya Regency**, West Java.
    - Type of Activity : Presentation of material about Microinsurance with power point media.
    - Activity purpose: The purpose of this activity is to increase knowledge and form a Cooperative in the community about Micro insurance which is expected to be applied in daily activities.
    - Activity Benefit : With this socialization activity, the community can understand about micro insurance which will make farmers prosperous in the future.
    - Activity Target : Parungponteng Village Community
    - Date : Wednesday, 20 July 2022
    - Number of Participants : 20 people
    - Teaching Materials : Media *power point, pretest , and post-test.*
    - Obstacle :
        - After the rest session, people start to get tired and can't focus anymore
    - Solution:
        - In between the material, entertainment is inserted in the form of question and answer with prizes.
    - Result : Prior to the socialization of the pretest results, 17 out of 20 or about 85% of the people had good knowledge. After socialization according to the calculation of post-test results, those with good knowledge increased to 18 out of 20 or around 90% of the community.
    - Executive roll : The research working group provides socialization
    - Community role : Socialization participants

5. Conclusion

From the indicators shown, it is hoped that the community, especially the prosperous farmer groups, can understand the strategy for implementing agricultural micro insurance as an effort to minimize losses from agricultural risks in Parungponteng Village, Tasikmalaya Regency. Thus, in the long term agricultural micro insurance can be implemented and controlled properly and the community is ready to have agricultural micro insurance products so that the impact of agricultural risk losses can be minimized and has capital protection. In addition, it is hoped that it can be used as a model for other regions in an effort to implement the benefits of agricultural microinsurance.

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