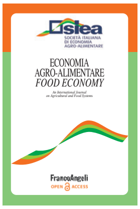
Economia agro-alimentare /
Food Economy

An International Journal on Agricultural and Food Systems

Vol. 23, Iss. 2, Art. 5, pp. 1-24 - ISSN 1126-1668 - ISSNe 1972-4802
DOI: 10.3280/ecag2-2021oa12184



Comparison study of agricultural insurance government subsidy and farmers' self-subsistent premium in Indonesia

Muhammad Yasir Yusuf[*,a], **Rahmat Fadhil**[b], **T. Saiful Bahri**[b], **Hafiizh Maulana**[a]

[a] Ar-Raniry Islamic State University, Indonesia
[b] Syiah Kuala University, Indonesia

Abstract

Agricultural Insurance as an embodiment of farmer protection and empowerment is carried out with The Rice Farming Business Insurance (AUTP) facility with an insurance premium scheme by the Government of 80% and 20% by farmers. This study aims to simulate the AUTP premium based on government's subsidy and farmers' self-subsistent premium. The simulation test used panel data estimates in Indonesia Province during 2016-2019. The AUTP premium simulation was identified through the Moderating Regression Analysis (MRA) approach, with the moderate variables being government subsidies and farmers' self-subsistent premium. The Government's premium subsidy policy became a pure moderator that significantly increased the AUTP land area by 0.057%. Meanwhile, the coefficient of the farmers' self-subsistent premium variable has a negative and significant effect on the realization of AUTP in Indonesia. The results of the policy simulation emphasize the importance of the government's role in encouraging the increase in the realization of AUTP through subsidizing premium assistance to farmers. The implication of this simulation of the MRA model is that the response and participation rate of the farmers' premium payments independently is not followed

Article info

Type:
Article
Submitted:
11/02/2021
Accepted:
07/06/2021
Available online:
06/09/2021

JEL codes:
Q14, Q18, E37

Keywords:
Agricultural insurance
Premium
Government's subsidy
Farmers
Moderating regression analysis

* *Corresponding author*: Muhammad Yasir Yusuf - Associate Professor - Ar-Raniry Islamic State University Indonesia - Department of Islamic Economics - Darussalam Banda Aceh - Indonesia - E-mail: muhammadyasir@ar-raniry.ac.id - phone number: +628116877886

by an increase in the realization of AUTP in Indonesia. The policy implications in the simulation of the two equation models conclude the importance of managing subsidized farmer premium payments and self-subsistent schemes based on insured land and farmer insurance policy. Agricultural insurance policy needs to adopt risk management tools, diversify agricultural insurance programs, and calculate the willingness to pay agricultural insurance premiums appropriately.

Managing Editor: Maro Vlachopoulou

Introduction

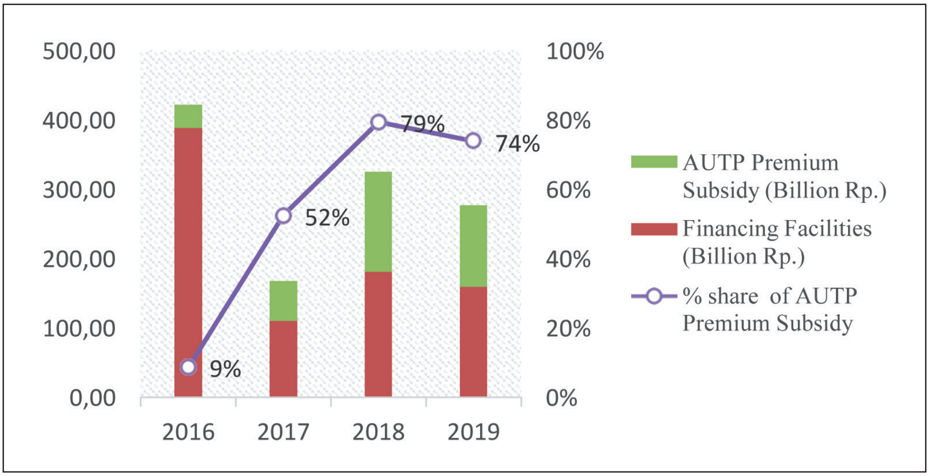
The agricultural sector is always faced with a variety of risks that result in a decrease in production scale, losses, and crop failures. Risks arising from farming activities become a gap between the expected rate of return and the actual rate of return, so farmers must carry out a series of cost calculations, both planned and not. Farmers without doing a series of risk calculations, often have difficulty in carrying out mitigation efforts such as climate change, pest/disease attacks, and all forms of events that cause farming losses. Risk mitigation in farming can be implemented in the form of transfer of risk through agricultural insurance product facilities.

Agricultural insurance in various studies and implementations that have been running in Indonesia since 2015 by providing a focus on funding in the form of working capital recovery for losses suffered. Agricultural insurance within the framework of protection of rice farming as regulated in Law no. 19/2013 concerning protection and empowerment of farmers, classifying risks in the form of natural disasters, attack of plant-disturbing organisms, epidemics of infectious animal diseases, impacts of climate change, and/or other types of risks regulated by Ministerial Regulation. The central government and regional governments in accordance with their authority are obliged to facilitate every farmer to become a participant in agricultural insurance. Besides, in its implementation, the government issued the Minister of Agriculture Regulation No. 40/Permentan/SR.230/7/2015 concerning agricultural insurance facilities which in Article 9, included: (1) ease of registration to become a participant, (2) easy access towards insurance companies, (3) socialization of insurance programs to farmers and insurance companies, and (4) premium payment assistance.

The implementation of agricultural insurance programs in Indonesia aims to protect and empower farmers from a variety of risks of loss and crop failure. The implementation of the Rice Farming Business Insurance Program (AUTP) was first tested in 16 provinces in 2015 with a target of 1,000,000 hectares. The trial was started in the middle of October to December 2015 with the realization of 233,499.55 hectares or 23.35% (Directorate General of PSP, 2015). Based on the Strategic Plan of the Directorate of Agricultural Financing of the Ministry of Agriculture of the Republic of Indonesia Ministry of Agriculture (2016), the agricultural insurance program is targeted to be able to reach an area of land for 2015-2019 of 6.5 million hectares. In reality, the realization until 2019 has only reached a total land area of 2.9 million hectares or 45% of the planned target.

The government's premium subsidy policy in the implementation of AUTP is sourced from the Budget Implementation List of State Budget (APBN) in the Ministry of Agriculture through agricultural financing facilities. The PSP Ministry of Agriculture's annual report (2018) detailed the budget realized in the overall AUTP program (including AUTP operations) at 117 billion or 80.71% of the target set. The realization of the AUTP budget has decreased compared to 2017, which was able to absorb 99.8%. In full, the trend data showing the realization of the AUTP financing budget and the amount of government's premium subsidy for 2016-2019 (Figure 1).

Figure 1 - Chart of Development of AUTP Indonesia Premium Financing and Subsidy Facilities for 2015-2018



Source: Annual Report of PSP General Director 2016-2019.

The average premium subsidy budget for AUTP products for 4 years can be absorbed by 54%. The overall growth rate of the AUTP premium subsidy budget grew by an average percentage of 67%. The increase in premium subsidy experienced a significant increase in 2017, with realization growth reaching 149%. This increase is the implication of increasing farmers' interest and mitigating the risk of rice crop business in the AUTP program in other regions, especially in Java. In terms of budget contributions to agricultural financing facilities, the 2017 AUTP premium subsidy program was also able to contribute to a growth rate of 27%. The realization of the agricultural financing facility budget in 2018 experienced a downward trend of 12%, followed by a decrease in the absorption of the AUTP subsidy premium budget by 5%. AUTP premium subsidy is a major component in empowering farmers to participate in the AUTP facility.

The realization of the AUTP premium budget will provide an initial picture of the importance of the role and contribution of the central government in increasing the achievement of the AUTP program in Indonesia. In the next test, a simulation of AUTP premium subsidy policy will be carried out as a role in increasing the realization of AUTP land achievements in 21 provinces in Indonesia.

As for the scheme of implementing agricultural insurance based on the Decree of the Minister of Agriculture No. 02/Kpts/SR. 230/B/01/2020 concerning AUTP premium assistance guidelines, the price of rice crops coverage is set at Rp. 6,000,000 per hectare per planting season with a total premium of Rp. 180,000 per ha/MT. The amount of premium assistance from government subsidy is 80% or Rp. 144,000/ha/MT and the remaining farmers are self-supporting Rp. 36,000/ha/MT. Implementation of the AUTP Premium according to the Performance Report (2018) and Annual Report (2018) of the Directorate General of Infrastructure and Facilities of the Ministry of Agriculture of the Republic of Indonesia, there are technical constraints where farmers who feel their land is safe from risk are still reluctant to become insurance participants and farmers willing to pay a 20% self-help premium still low. Farmers do not fully understand the objectives and benefits of insurance activities.

Based on data from the Directorate of Agricultural Financing (2018), financial realization absorbed from agricultural financing facilities for agricultural insurance reached 117.718 billion (reached 80.71% of the target of the AUTP program). The large budget value for the AUTP premium subsidy facility should be able to provide a stimulus for farmers' participation in the agricultural insurance program.

1. Background

Concerning the practice of Agricultural Insurance in many countries, two ideas are implemented: The first idea is; agricultural insurance practices through Government intervention by providing premium subsidy assistance to farmers. Caneja *et al.* (2009) divides subsidy from the government in terms of insurance premium paid by the government, with details of Australia 46%, Rep. Czech 30%, France 2.4%, Italy 67%, Portugal 68%, and Spain 41%. An overview conducted by Mahlul & Stutley (2010) on agricultural insurance programs that developed in 65 countries, described the features of public support in expanding agricultural insurance through premium subsidy in areas of land with hail climate. Bozzola *et al.* (2018) reveal that the importance of seasonal climate changes when measuring impact and considering climate adaptation policies. the climate is an important factor determining land value in Italy.

According to Wenner and Arias (2003), high-income countries, such as the United States, Spain, France, and Italy, provide agricultural subsidy schemes in the form of; subsidized premium, operational subsidy, and subsidized reinsurance in reducing or managing risk. The crop insurance subsidy policy in Italy by Santeramo *et al.* (2016) explained the individual farmer model in terms of entry and exit the crop insurance program. the findings show that education and farm size are determinants of participation in the insurance market.

The second idea is the practice of agricultural insurance through a market/private mechanism without a premium subsidy policy. The practice of agricultural insurance by private and open markets is carried out in several Latin American countries such as Argentina, Brazil and Bolivia (World Bank, 2010). Mitu (2007) also gave a description of agricultural insurance practices in Romania with the Public-Private partnership model through insurance premium payments by call and put agricultural contracts based on the weather index.

In the context of agricultural subsidy policy practices in Indonesia, the results of the simulation of agricultural insurance premium subsidy produced several findings. A study conducted by Ambarawati *et al.* (2018) who looked at the perspective of farmers in mitigating the risk of rice farming in Bali Province, found that 85% of respondents involved in the AUTP scheme wanted full premium subsidy from the government, while the remaining 15% of respondents were willing to pay premium independently. In another study, Mega *et al.* (2019) examined the farmers' satisfaction index of the AUTP attribute, resulting in a Farmer Customer Satisfaction Index value of 52.82% or the range of scores quite satisfied. Specifically, the value of satisfaction with farmers' premium subsidy by the government is confirmed with the largest Weight Score value of all attributes assessed, which is 0.137.

The parametric method of the AUTP Program premium conducted by Muraqin *et al.* (2016) proposed a method of estimating the premium amount of the AUTP insurance program in Indonesia by using a parametric statistical approach by assuming that the average yield of rice per hectare follows a normal distribution with an estimated premium of around Rp. 179,000 to Rp.

268,000. The implementation of AUTP in Indonesia, which has been running until 2020, maintains an AUTP subsidy premium scheme of Rp. 180,000. The review of the implementation of the AUTP using parametric empirical data has not been comprehensively carried out panelly at the provincial estimation level and on an annual scale.

Some empirical studies of the implementation of AUTP premium subsidy that have been carried out are still limited in the scope of cross-sectional modeling. Empirical studies of premium subsidy practices and farmers' responses are carried out in logistical modeling and willingness to pay, such as Iswandi (2016), Mutaqin (2016), Surning *et al.* (2018), and Yanuari *et al.* (2019). However, as far as the search has been done, there is no more comprehensive research on the AUTP governance panel data test in Indonesia. The subsidy policy simulation needs to be carried out in a broader perspective using empirical data on the implementation of agricultural insurance in Indonesia.

The AUTP premium subsidy policy simulation aims to provide empirical study space, the role of government's premium subsidy and farmers' premium contributions in supporting the implementation of agricultural insurance facilities in Indonesia. Panel Data Moderation Analysis was chosen because this model was able to identify the effects of moderation arising from government premium subsidy and smallholder self-help on the realization of AUTP in Indonesia. Therefore, the simulation results of the AUTP premium modeling for subsidy and self-help will map the impact and policy response to improve AUTP performance in Indonesia.

2. Materials and methods

The study of agricultural insurance in Indonesia was carried out with a quantitative approach with the modeling of agricultural insurance premium subsidy. Modeling was done using panel data estimation, which compiled data on regional/provincial scope (cross sectional) with an annual time span scale (time series). The use of panel data will increase the degree of freedom and reduce the possibility of colinearity (significant linear relationship) between independent variables. According to Baltagi (2005) the panel data approach provides the following advantages:

- controlling individual heterogeneity (individual heterogeneity);
- providing more informative data, variability which further reduces collinearity between variables, increases degrees of freedom and is more efficient;
- learning the dynamics of adjustment better (dynamics of adjustment);
- identifying and measure effects that cannot be detected in the time series or cross section data models better;

- it is possible to form and test behavior models that are more complicated than time series or cross section data models;
- macro panel data has a longer set of time and is not like the typical non-standard distribution problem of unit root testing in time series analysis.

Secondary data collection was done by a series of tabulation steps of AUTP performance panel data and land area intensity that experienced several risks in the rice crop sector. Based on the consistency of AUTP realization data in the annual report of the Indonesian Ministry of Agriculture and the performance report of the Directorate General of PSP, the Ministry of the Republic of Indonesia, 21 Provinces was used as samples of simulated agricultural insurance premium. For the time series scale, it was set from 2016 to 2019. The following Table 2 tries to explain the operational definition of variables in the simulation of agricultural insurance premium subsidy policies.

Table 1 - Definition of operational variables in the simulation of agricultural insurance premium subsidy policies

Variable	Operational Definition	Information
AUTP performance	Achievement percentage of the realization of the AUTP implementation of the target	Dependent
Land of Insurance	Land area of rice plants registered by farmers as AUTP Policy (in Ha)	Independent
Premium Subsidy	The amount of premium subsidy by the Government is 80% of the premium paid (in Rp)	Moderating
Self-subsistent	Self-subsistent premium paid by farmers amounting to Rp. 36,000 (in Rp)	Moderating
Plant Pest (HPT)	The intensity of paddy fields damaged due to a number of attacks such as Rice Stem Borer, Brown Planthopper, Rat, Blas, Hawar Daun/ Crackle, and Tungro (in Ha)	Control
Flood Land	The intensity of the area of rice fields damaged due to flooding (in Ha)	Control
Drought Land	The intensity of the area of rice fields damaged due to drought (in Ha)	Control

Source: processed by authors.

Model of Analysis

The main framework in the simulation of agricultural insurance premium policy is to combine the multiple linear regression estimation model of panel data by placing the government premium subsidy variable as a Moderating Regression Analysis (MRA). Panel data regression model analysis is known as three kinds of approaches which consist of pooled least square approach, fixed effect approach, and random effect approach (Nachrowi, 2006). The selection of the panel data regression approach will be tested with the Chow test and Hausman test. Chow tests determine the choice of the best model between the common effect or fixed-effect model. Next, the Hausman test is conducted to determine the best choice between the fixed effect or random effect model (Muliadi and Amri, 2019).

The equation function will be transformed in logarithmic form, considering that each variable has a different size. As explained earlier, this research will establish moderating innovation variables in the equation model. Moderated Regression Analysis (MRA) is a special model of linear regression whose regression equation has an element of interaction between variables (Ghozali, 2014). Determination of variable moderation aims to see the effects of moderation as an element that reinforces or weakens the influence between independent and dependent variables.

In this study, the use of MRA is intended to further identify the role of government and farmers' self-subsistent premium on AUTP performance in Indonesia. That is, in the AUTP premium simulation, the interaction of moderating variables will identify how strong the influence of moderation can increase the realization of AUTP provinces in Indonesia. Then it can be simulated two MRA equation models:

- First Simulation: AUTP premium simulation model with government's subsidy policy as a moderating variable. This simulation is based on the AUTP premium policy based on the Minister of Agriculture Decree No. 02/Kpts/SR. 230/B/01/2020 regarding guidelines for AUTP premium assistance of 80% or Rp. 144,000/ha/growing season. In addition to seeing the role of AUTP premium subsidy as a moderating variable in the relationship between AUTP land area and AUTP performance, a risk control variable for rice farming is also included.

Equation of MRA 1:

$$Log(AUTP_{it}) = a_{it} + \beta 1\log(LA_{it}) + \beta 2\log(Subs_{it}) + \beta 3\log(MDR1_{it}) + \beta 4\log(LHPT_{it}) + \beta 5\log(LB_{it}) + \beta 6\log(LK_{it}) + e_{it}$$

- Second Simulation: AUTP premium policy simulation model by testing the role of self-subsistent farmers' premium as a moderating variable on the

AUTP land area with AUTP performance with risk control variables in rice farming land (Figure 2). The second simulation model only distinguishes the variable moderation of premium paid for self-help by farmers which is set at Rp. 36,000/farmer.

Equation of MRA 2:

$$Log(AUTP_{it}) = a_{it} + \beta 1 \log(LA_{it}) + \beta 2 \log(Swad_{it}) + \beta 3 \log(MDR2_{it}) + \beta 4 \log(LHPT_{it}) + \beta 5 \log(LB_{it}) + \beta 6 \log(LK_{it}) + e_{it}$$

Notes:

Subs : Government's premium subsidy
Swad : Farmers' self-subsistent's premium
MDR1 : Moderating variable multiplication results between AUTP land area and government's premium subsidy
MDR2 : Moderating variable multiplication results between AUTP land area and farmers' self-subsistent's premium
AUTP : Performance of AUTP
i : Cross sectional consists of 21 provinces
t : Year of observation (2016-2019)
a : Constant
β1-β6 : Regression coefficient
LA : Insured Land
LHPT : Intensity of damage to rice fields due to HPT attacks (control variable)
LB : Intensity of damage to rice fields due to flooding (control variable)
LK : Intensity of damage to rice fields due to drought (control variable)
e : Error term

3. Results

Equation model simulation was done on the basis of placing moderation variables as roles that strengthen and/or weaken the influence of insured land area on the realization of AUTP in Indonesia. As explained in the research methodology, the equation model will test 2 simulations; they are:

- simulation of governments' premium subsidy policy as a moderating variable;
- simulation of farmers' premium self-subsistence as a moderating variable. Before further analysis, a feasibility study of panel data estimation models was firstly conducted to be used for MRA analysis. The method of testing the feasibility of the model was done by the Chow Test and the Hausmaan Test. In the panel data estimation there are 3 models, namely pooled least square (PLS), fixed-effect model, and random effect model

(REM). The model selection criteria can be approached with the following test:

- if the value of the redundant test and the Hausman test are both significant then the FEM model is used;
- if the redundant test is significant and the Hausman test is not significant, then the REM model is used;
- if the redundant test and the Hausman test are both insignificant, the PLS model is used.

Table 2 - Panel Data Estimation Model Selection Test

Model	Test	Statistic (Cross Section F/Chi Square)	Conclusion
Simulation 1a Non MRA	Chow Test	3,965***	Fixed Effect Model
	Hausmann Test	13,702**	
Simulation 1b MRA	Chow Test	8,849***	Fixed Effect Model
	Hausmann Test	13,081***	
Simulation 2a Non MRA	Chow Test	3,92***	Fixed Effect Model
	Hausmann Test	11,83**	
Simulation 2b MRA	Chow Test	3,406***	Fixed Effect Model
	Hausmann Test	11,883*	

Information:
* significant at α 10% ($p < 0.1$);
** significant at α 5% ($p < 0.05$);
*** significant at α 1% ($p < 0.001$).

Based on the results of the equation model test for each simulation, consistently the panel estimation model was chosen and the most appropriate in explaining the equation relationship was the fixed effect model (FEM). So in explaining the simulation results and policy implications, the model used was FEM.

Simulation of Government's Premium Subsidy Policy

The MRA analysis model in the simulation of the government's premium subsidy policy was based on the 80% premium value borne by the government based on the area of insurance participants. This policy is notated as M Simulation involving risk control variables of land damage, considering that this risk aspect is something that is unpredictable. The panel estimation results with 3 equation models are as in Table 3.

Table 3 - Simulation estimation of the government's premium policy substitution panel as a moderating variable for AUTP performance in Indonesia

Variable	***Panel FEM Non MRA (1a)***		***Panel FEM MRA (1b)***	
	Coefficient	**t-stat**	**Coefficient**	**t-stat**
Dependent Variable: AUTP				
Konstanta	25.323	0.303	–39.566	–0.603
LHPT	0.200	1.615	0.389	2.730 (***)
LK	–0.021	–0.756	0.061	2.653 (***)
LB	0.009	0.290	–0.050	–1.686 (*)
LA	2.787	0.396	–4.241	–0.765
SUBS	–2.456	0.349	3.071	0.556
MDR1	–	–	0.057	6.795 (***)
R-squared	0.730		0.860	
F-stat	9.912 (***)		20.163 (***)	
Total Observation	**82**		**82**	

Source: Output E-Views 8.0.

Information:
* significant at α 10% (p < 0.1);
** significant at α 5% (p < 0.05);
*** significant at α 1% (p < 0.001).

The estimation results, as in Table 3, illustrated that the panel equation model with the MRA that placed the moderating variable premium subsidy on insured land gave a greater coefficient of determination (*R-Square*). Then it can be argued that government policy in terms of premium subsidy on the land of insurance was able to moderate and increase the realization of AUTP in Indonesia. The coefficient of determination of the MRA equation model was 13% greater than non-MRA.

The interpretation is a step to encourage the performance of the implementation of AUTP in the context of protection and empowerment of farmers, has a great dependence on the policy of premium subsidy by the central government. This can be seen from the aspect of using MRA variable government subsidy premium that were able to moderate the increase in the realization of AUTP in Indonesia. In Panel FEM MRA (1b), most of the coefficients of each variable are partially significant, both the independent variables and the control variables. It means the policy of premium subsidizing insurance by the central government is a major element in the governance of the AUTP program in Indonesia. Some specific explanations of variables can be explained below:

- the land area insured does not directly affect the achievement of AUTP realization in Indonesia. The implementation of agricultural insurance subsidy contracts in Indonesia is indemnity-based, where coverage is based on actual loss or damage experienced by farmers for 75% of the total damage in 1 hectare of land. Referring to the Regulation of the Minister of Agriculture Number 30/Kpts/SR.2010/B/12/2018 about AUTP Premium Assistance Guidelines is carried out by checking and assessing the area of subsidized land by regional field agricultural. This relationship showed that the use of subsidized insurance budget in the scale of the AUTP land area must interact with each other. This interaction means that the implementation of the AUTP premium subsidy must refer to information on high risk endemic lands. The target of subsidized AUTP land must consider the risk profile to maintain the sustainability of the insurance company. Its implementation is not only carried out in endemic areas – anti-selection;
- if the variable land area of insurance and subsidy policy interact, it will be able to increase the achievement of AUTP realization in Indonesia. This MRA relationship illustrates, increasing 1% of AUTP premium subsidy based on the area of the land insured by farmers, then the realization of AUTP will increase by 0.057%. In other words, the role of premium policy subdivision was able to strengthen and enlarge the achievement of the implementation of the land area of insurance by 0.057%.

Simulation of Self-subsistent Premium of Agricultural Insurance in Indonesia

The next simulation provided an empirical study of the implementation of AUTP by placing farmers' self-subsistent premium as a moderating variable. In this second simulation, the effect of the area of insured land on AUTP performance would be moderated by farmers' self-subsistent premium.

Similar to the first simulation, the control variable also consisted of various rice crop risk (Table 4).

Table 4 - Simulation of the Estimation of Farmers' self-subsistent Premium Panel as an AUTP Performance Moderation Variable in Indonesia

Variable	*Panel FEM Non MRA (2a)*		*Panel FEM MRA (2b)*	
	Coefficient	**t-stat**	**Coefficient**	**t-stat**
Dependent Variable: AUTP				
Constant	–2.477	–1.640	0.512	0.242
LHPT	0.244	2.113 (**)	0.227	1.912 (*)
LK	–0.033	–1.207	–0,028	–1.016 (*)
LB	0.028	0.898	0.002	0.066
LA	0.389	9.018 (***)	0.078	0.458
SWAD	–0.118	–1.986 (**)	–0.269	–2.754 (***)
MDR2	–	–	0.017	1.921 (*)
R-squared	0.750		0.760	
	10,721 (***)		10,756 (***)	
Total Observation	**82**		**82**	

Source: Output E-Views 8.0.

Information:
* significant at α 10% ($p < 0.1$);
** significant at α 5% ($p < 0.05$);
*** significant at α 1% ($p < 0.001$).

Estimation results in equation models 2a and 2b showed that there was a difference between the influence of the area of insured land before and after the self-subsistent premium variable. In equation 2a, there was a significant influence between the area of insured land on the achievement of AUTP realization in Indonesia. An increase in the area of insured land by self-subsistent by 1% would have an impact on the increase in AUTP realization by 0.389%. Meanwhile, Equation Model 2b with the innovation of placing variable moderation of farmers' self-subsistent premium with agricultural insured land coverage, did not significantly influence the achievement of AUTP realization in Indonesia. The estimation results of equations 2a and 2b can be explained as follows:

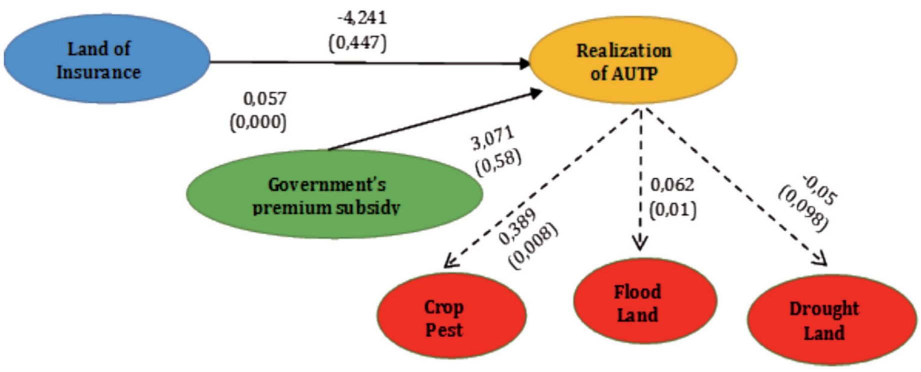
- in the second simulation, the effect of farmers' self-subsistent variables had the same coefficient direction between equation models 2a and 2b. The variable coefficient of agricultural insurance self-subsistent premium had both a negative and significant effect on the realization of AUTP in Indonesia. In other words, it can be explained that if the farmers' self-subsistent premium increase by 1% would have an impact on the AUTP realization decrease of 0.118% (2a) and 0.269 (2b). There were indications of symptoms that indicated farmers' interest to participate in the insurance program because they were not willing to pay a self-subsistent premium of Rp. 36,000 as stipulated in the Republic of Indonesia Decree. No. 02/Kpts/SR.230/B/01/2020 about the AUTP premium assistance guidelines;
- on the other hand, the placement of MRA innovation variables by looking at the interaction of self-subsistent premium variables with the area of insured land was able to drive an increase in AUTP realization by 0.017%. The interaction of this variable had a significant and positive relationship direction at the 90% confidence level (p-value 0.1). AUTP governance by optimizing farmers' self-subsistent premium payment based on land area, would provide a positive image of AUTP performance improvement;
- control variables of land damage from the aspect of HPT attacks, floods, and drought as a whole had the same direction to the AUTP performance. The mechanism of offset losses to farmers due to drought had a negative impact on AUTP performance in Indonesia. Chavas *et al.* (2019) captured that adverse weather has significant and persistent effects on agricultural productivity;
- in the second simulation model, farmers' self-subsistent premium were more controlled by the impact of land damage due to HPT attacks. This means that farmers' responses to HPT attacks were more dominant encouraging their participation in agricultural insurance programs;
- the simulation of the AUTP equation model with a self-subsistent premium from farmers had a moderating relationship that is Quasi moderator. This result was illustrated by the significant variable farmers' self-subsistent premium before and after the interaction of moderating variables with the independent variables in the two equations (2a and 2b).

Implications of AUTP Premium Policy in Indonesia

The results of the policy simulation stressed the importance of the government's role in encouraging the escalation of AUTP realization through subsidizing premium assistance to farmers. The Indonesian government should gradually decrease the amount of subsidy to increase the self-resilience and empowerment of farmers in Indonesia. The Comparison of government subsidy premiums and self-sufficiency implies that the dependence on following AUTP products through subsidies by the government with the cost compensation model is still very large. The adoption of risk management tools needs to be developed to realize the independence of farmers to pay premiums independently.

Based on simulation model 1, the interaction of subsidized moderation variables with the area of insured land could increase the achievement of AUTP performance in Indonesia. If illustrated in the MRA model scheme, we can see the actual coefficient value in Figure 2.

Figure 2 - Simulation Scheme of Government's Premium Subsidy of MRA Model



The government's premium subsidy policy of 80% to farmers participating in insurance must be implemented in an integrated manner based on the policy basis of the Prospective Participants/Candidates for Land (CP/CL) of farmers. This can be seen in the MRA simulation scheme, where variable land area and subsidy without moderation did not affect AUTP performance. Thus, the right target farmers' premium subsidy policy instrument would be able to improve the relationship between land area and AUTP performance by 0.057%. The Indonesian Ministry of Agriculture needs to verify accurately and credibly in the provision of premium subsidy for farmers. AUTP performance can be optimally realized with this good process.

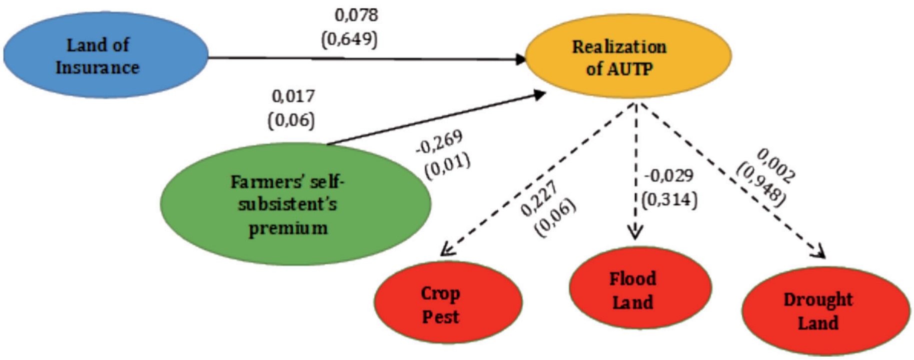
Empirically, the simulation results of willingness to pay (WTP) for farmer premium payments using the Contingen Valuation Method (CVM) found that the willingness to pay was IDR 30,853/Ha/cropping season (Surning *et al.*, 2018) and Rp. 30,358/ha/croping season (Mutaqin, 2019). Socio-economic variables such as farmer tenure status, farmer education level, and rice farming productivity have influenced the WTP to join the Rice Farm Insurance program. The rice farmining insurance premium of IDR 60,000 per hectare can be charged to insurance, while the government can reduce the subsidy to IDR 120,000 per hectare in one planting season. The farmer's willingness to pay is equivalent to 1.0% of the value coverage premium (Budiasa *et al.*, 2020).

AUTP Premium Subsidy Policy has become an important element in moderating the relationship between land area and the achievement of insurance realization, also known as pure moderator. Pure moderator occurs if the independent and moderating variables become significant to the dependent variable, after the interaction between variables. So in this case, the policy of premium subsidy to farmers absolutely must be carried out at 80% as stipulated in the Republic of Indonesia Ministry of Agriculture. No. 02/Kpts/SR. 230/B/01/2020 concerning AUTP premium assistance guidelines. An empirical study of 240 smallholder farmers in Garut Proviance Regency, West Java by Mutaqin (2019), found that a strategy approach to the sustainability of farmer insurance premiums, can be carried out by reducing premiums (supply side) and increasing farmer WTP (demand side). The farmer requires the allocation of more government budget to the premium subsidy; however, due to the financial constraints on the government, further subsidy for the premium cannot be relied upon.

The next simulation provided an empirical study of the implementation of AUTP by placing farmers' self-subsistent premium as a moderating variable. In this second simulation, the effect of the area of insured land on AUTP performance would be moderated by farmers' self-subsistent premium. AUTP premium also regulates farmers'self-subsistent contributions of IDR 36,000/ha/MT or 20% of the total premium after the government's subsidy. Based on the simulation results in the context of farmers' self-subsistent premium as a moderating variable that interacts with land area, it was found that there was a positive and significant direction of influence on AUTP performance in Indonesia. Simulation results with the provisions of farmers' self- subsistent premium can be explained in Figure 3.

The MRA model simulation results are related to the effect of variable moderated farmers' self-subsistent premium in increasing the achievement of AUTP performance giving a significant impact of 0.017%. However, the self-subsistent premium policy directly had a negative impact of 0.26% on AUTP performance in Indonesia. The implication of this MRA model simulation was that the response and participation rates of farmers' premium payments were not independently followed by an increase in the realization of AUTP

Figure 3 - Simulation Scheme of Farmers' Self-Subsistent Premium of MRA Model



in Indonesia. This means that agricultural insurance policies in order to encourage the independence of farmers have not yet developed optimally.

The Indonesian government needs to make efforts to diversify AUTP products to encourage the independence of farmers. Crop Diversification is a strategy that can be used as a solution to increase the participation of farmers participating in agricultural insurance. this was confirmed by Di Falco *et al.* (2014) and Santeramo *et al.* (2016) in the implementation of crop insurance in Italy which adopts crop diversification as an alternative risk management strategy and a substitute for financial insurance in hedging against the impact of risk exposure on welfare.

The MRA model simulation results are related to the effect of variable moderated farmers' self-subsistent premium in increasing the achievement of AUTP performance giving a significant impact of 0.017%. However, the self-subsistent premium policy directly had a negative impact of 0.26% on AUTP performance in Indonesia. The implication of this MRA model simulation was that the response and participation rates of farmers' premium payments were not independently followed by an increase in the realization of AUTP in Indonesia. This means that agricultural insurance policies in order to encourage the independence of farmers have not yet developed optimally.

The simulation of the AUTP equation model with a self-subsistent premium from farmers had a moderating relationship that is Quasi moderator. This result was illustrated by the significant variable farmers' self-subsistent premium before and after the interaction of moderating variables with the independent variables This simulation provided an overview of the importance of self-subsistent farmers' premium payment management based on the area of land administration registered in the insurance policy. Therefore, the implications of government policy to encourage the independence of farmers to participate in paying premium contributions must be in line with the insured land ownership information system.

Jayanto (2018) explained that the risk of crop failure is the risk of farmers' households who do not get results on their farming business, with the category of puso per hectare caused by drought, floods, and attacks of Plant Disturbing Organisms (OPT), with a percentage of damage of 75% of the total land area. The risk of land damage as a control variable in the equation simulation had a significant directional relationship to AUTP performance in Indonesia. AUTP performance was absorbed dominantly and significantly by 38.9% due to HPT attacks. The HPT in question includes, among others, Rice Stem Borer, Brown Planthopper, Rat, Blas, Hawar Daun/Crackle, and Tungro. There were indications that many AUTP claims were caused by HPT attacks that were difficult to control by farmers. For the risk of land drought, the amount of intensity that affected the performance of AUTP is only absorbed by 6.2%. Flooding land in the context of model 1 simulation has a negative effect on AUTP performance in Indonesia.

Similar to the simulation of the first model, in model 2, HPT control variables also dominantly absorbed the damage rate or AUTP claim, amounting to 22.7%. As for damage due to the floods and drought the absorption rate was low. The level of damage caused by HPT attacks encouraged farmers to designate areas whose land is to participate in the AUTP program. This indicated that HPT damage was more predictable by farmers and more compatible with the protection of short-term rice business.

This study has limited data coverage and methodology at the level of realization of the Agricultural Insurance Program (AUTP) in a cross-sectional manner at the provincial level in Indonesia. An in-depth study to see the behavior of farmers in order to be willing to pay agricultural insurance premiums must be reviewed in the context of primary data on independent farmer participants and government subsidies. The willingness to pay study is useful for identifying the impact of farmers' willingness to participate in the Agricultural Insurance Program.

4. Conclusions

The premium subsidy policy in the AUTP program has an important role in the implementation of protection and empowerment of farmers in Indonesia. Premium subsidies by the government can increase the area of insurance land which can further improve the performance of AUTP in Indonesia. The results of the simulation of the premium policy with the MRA prove that an increase in the area of insured land will not have a significant effect in increasing AUTP performance without being moderated and strengthened by an 80%

premium subsidy facility. Premium subsidies by the government are pure moderators in the AUTP simulation scheme in Indonesia.

Farmers' self-subsistent premium in the MRA model simulation scheme affects the improvement of AUTP performance in Indonesia. The MRA model simulation results prove that the self-subsistent premium directly has a negative impact of 0.26% on AUTP performance in Indonesia. Agricultural insurance policies in order to encourage the independence of farmers have not yet developed optimally. However, farmers' self- subsistent premium is able to moderate the relationship between land area and AUTP performance.

Farmers' awareness of adapting to risk mitigation is still meager. The farmers need to improve their understanding of the negative impacts of climate change. furthermore, the government should prepare an independent Agricultural Insurance scheme that can practically decrease the 80% government subsidy gradually. consequently, risk management tools adoption needs to be made based on the risk profile in each region, the diversification of agricultural insurance programs, and the calculation of the willingness to pay agricultural insurance premiums appropriately.

So overall, it can be concluded that the simulation model of AUTP premium subsidy policy and farmers' self-subsistence is very closely related to the area of land registered in the insurance policy. Both simulation models confirm the impact of moderation on subsidized premiums and self-subsistent premium on enhancing AUTP performance in Indonesia. The government needs to carry out the land verification policy set out in the AUTP program. The CP/CL element will have an impact on increasing AUTP performance, both in terms of the premium subsidies approach and independent smallholders.

Acknowledgement

The author thanks the Regional Development Planning Agency (BAPPEDA) of Aceh, the Department of Agriculture and Food Crops (DITANBUN) of the Aceh Province and the Education Fund Management Agency (LPDP), Productive Innovative Research (RISPRO) Governance/Policy, Ministry of Finance of the Republic of Indonesia No. PRJ-120/LPDP/2019.

References

Ambarawati, G.A.A., Wijaya, M.A.M. & Budiasa, W. (2018). Risk Mitigation for Rice Production Through Agricultural Insurance: Farmers' Perspectives. *Jurnal Manajemen & Agribisnis*, *15*(2), 128-135, doi: 10.17358/jma.15.2.129.

Baltagi, Badi H. (2005). *Econometric Analysis of Panel Data*. New York: John Wiley and Sons, Ltd.

Bielza Diaz-Caneja, M., Conte, C.G., Gallego Pinila, F.J., Stroblmair, J., Catenaro R. & Dittmann C. (2009). Risk Management and Agricultural Insurance Schemes in Europe, JRC European Comission, -- available online at: http://ec.europa.eu/dgs/jrc/downloads/jrc_reference_ report_2009_09_agri_ins.pdf.

Bozzola, M., Massetti, E., Mendelsohn, R. & Capitanio, F. (2018). A Ricardian analysis of the impact of climate change on Italian agriculture. *European Review of Agricultural Economics*, *45*(1), 57-79, doi: 10.1093/erae/jbx023.

Budiasa, I.W., Maya Temaja, I.G.R, Ustriayana, I.N.G., Nuarsa, I.W. & Wijaya, I.G.B. (2020). The Willingness Of Farmers To Pay Insurance Premiums For Sustainable Rice Farming In Bali. *J. ISSAAS*, *26*(1), 63-72.

Chavas, J.P., Di Falco, S., Adinolfi, F. & Capitanio, F. (2019). Weather Effects and their Long-Term Impact on the Distribution of Agricultural Yields: Evidence from Italy. *European Review of Agricultural Economics*, *46*(1), 29-51, doi: 10.1093/erae/jby019.

Di Falco, S., Adinolfi, F., Bozzola, M. & Capitanio, F. (2014). Crop Insurance as a Strategy for Adapting to Climate Change. *Journal of Agricultural Economics*, *65*(2), 485-504, doi: 10.1111/1477-9552.12053.

[DJPSP] Direktorat Jenderal Prasarana dan Sarana Pertanian. (2015). *Laporan Tahunan 2016-2019 (2016-2019 Annual Report)*. Jakarta: Pusat Data dan Analisis Kementerian Pertanian RI.

[DJPSP] Direktorat Jenderal Prasarana dan Sarana Pertanian. (2017). *Laporan Kinerja Direktorat Pembiayaan 2017 (Directorate of Financing Performance Report 2017)*. Jakarta: Pusat Data dan Analisis Kementerian Pertanian RI.

[DJPSP] Direktorat Jendral Prasarana dan Sarana Pertanian. 2020. Pedoman Bantuan Premi Asuransi Usahatani Padi (Rice Farm Insurance Premium Assistance Guidelines). Jakarta (ID). Direktorat Jendral Prasarana dan Sarana Pertanian.

Direktorat Pembiayaan. (2016). *Rencana Strategis Direktorat Pembiayaan Pertanian Tahun 2015-2019 (Strategic Plan of the Directorate of Agricultural Financing for 2015-2019)*. Jakarta: Direktorat Pembiayaan Pertanian Direktorat Jendetal Prasarana dan Sarana Pertanian.

Ghozali. (2014). *Structural Equation Modeling Metode Alternatif dengan Partial Least Square PLS* ed. 4. Semarang: Badan Penerbit UNDIP.

Jayanto, T. (2018). Permodelan Premi Asuransi Mikro Keluarga Tani Berdasrarkan Pendekatan Portofolio dan Extreme Value Theory [Tesis] (Modeling of Farmers' Microinsurance Premiums Based on a Portfolio Approach and Extreme Value Theory [Thesis]). Departemen Manajamen Fakultas Ekonomi dan Manajemen Institut Pertanian Bogor (ID).

Kementerian Pertanian Republik Indonesia. (2019). *Statistik Iklim, Organisme Penganggu Tanaman dan Dampak Perubahan Iklim 2016-2019 (Climate Statistics, Plant Pests and Impacts of Climate Change 2016-2019)*. Jakarta: Pusat Data dan Sistem Informasi Pertanian Sektetariat Jenderal Kementerian Pertanian.

Mahul, O. & Stutley, C.J. (2010). Goverment Support to Agricultural Insurance Challenges and Options for Developing Countries. Washington DC: World Bank. -- Available at: http://publications worldbank.org.

Mitu, N.E. (2007). Agricultural Insurance in Romania: Present and Future Aspect. Munich Personal RePec Archive (MPRA), University of Craiova, Faculty of Economics and Business Administration, 198206. -- Available online at: http://mpra.ub.uni-muenchen.de/10773/.

Muliadi & Amri, K. (2019). Infrastruktur Jalan, Belanja Modal dan Kesempatan Kerja: Bukti Data Panel Kabupaten/Kota di Aceh. (Road Infrastructure, Capital Expenditures and Employment Opportunities: Evidence of District/City Panel Data in Aceh). *Jurnal Manajemen dan Sains*, *4*(2), 334-341, doi: 10.33087/jmas.v4i2.115.

Mustika, M., Fariyanti, A. & Tinaprilla, N. (2019). Analisi Sikap dan Kepuasan Petani terhadap Atribut Usahtani Padi di Kabupaten Kerawang Jawa Barat (Analysis of Farmers' Attitudes and Satisfaction with Rice Attributes in Kerawang District, West Java. Agribusiness Forum). *Forum Agribisnis*, *9*(2), 200-2014, doi: 10.29244/fagb.9.2.200-214.

Mutaqin, A.K. (2016). Kinerja Metode Perhitungan Premi Produk Asuransi Usaha Tani Padi di Indonesia (Performance of Calculation Method of Premiums for Rice Farmers Business Insurance Products in Indonesia. *Statistika*, *16*(1), 41-45, doi: 10.29313/jstat.v16i1.2279.

Mutaqin, A.K., Kudul, A. & Karyana, Y. (2016). Metode Parametrik untuk Menghitung Premi Program Asuransi Usaha Tani Padi di Indonesia (Parametric Methods for Calculating Premiums for Paddy Farmer Business Insurance Programs in Indonesia). *Ethos*, *4*(2), 318-326, doi: 10.29313/ethos.v0i0.1656.

Mutaqin, D.J. & Usami, K. (2019). Smallholder Farmers' willingness to pay for agircultural production cost insurance in rural west java, Indonesia: A Contingent Valuation Method (CVM) Approach. *Risk,* 7(69), 1-18, doi: 10.3390/risks7020069.

Nahrowi, D. Nachrowi & Usman, Hardius. (2006). *Pendekatan Populer daan Praktis Ekonometrika Untuk Analisis Ekonomi dan Keuangan. (Popular and practical approaches to econometrics for economic and financial analysis).* Jakarta: Lembaga Penerbit Fakultas Ekonomi.

[OJK] Otoritas Jasa Keuangan (2019). *Asuransi Usaha Tani Padi; Asuransi Usaha Ternak Sapi; Asuransi Perikanan Pembudidaya Ikan Kecil; Asuransi Nelayan (Paddy Farm Business Insurance; Cattle Business Insurance; Small Fish Farmer Fisheries Insurance; Fisherman Insurance).* Jakarta (ID)

Pasaribu, M.S., Agung, I.S., Agustin, N.K., Lokollo, E.M., Tarigan, H., Supriatna, Y. (2010). *Pengembangan Asuransi Usahatani Padi untuk Menanggulangi Risiko Kerugian 75% Akibat Banjir, Kekeringan, dan Hama Penyakit (Research Proposal: Development of Rice Farming Insurance to Cope with the Risk of 75% Loss Due to Flooding, Drought, and Disease Pests).* Bogor (ID): Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian.

Santeramo, F.G., Goodwin, B.K., Adinolfi, F. & Capitanio, F. (2016). Farmer Participation, Entry and Exit decisions in the Italian Crop Insurance Program. *Journal of Agricultural Economics*, *67*(3), 639-657, doi: 10.1111/1477-9552.12155.

Shadbolt, N.M., Olubode-Awasola, F., Grad, D. & Dooley, E. 2010. Risk - an Opportunity or Threat for Enterpreneurial Farmer in Global Food Market?. *Internasional Food and Agribusnisse Management Review*, *13*(4), 1-21, doi: 10.22004/ag.econ.96335.

Siswandi, B. & Farida, S. (2016). Respon Petani terhadap Program Pemerintah Mengenai Asuransi Usaha Tani Padi (AUTP) (Farmers Response to Government Programs Regarding Rice Farmer Business Insurance (AUTP)). *Prosiding Seminar Nasional Pembangunan Pertanian*, 169-177, -- available at: https://fp.ub.ac.id/semnas/Paper/29_asuransi_padi-bambang_siswadi_(169-177).pdf.

Surning, N., Ambarawati, A.A. & Ustriyana N.G. (2018). Willingness To Pay Petani terhadap Pelaksanaan Asuransi Usaha Tani Padi (AUTP) (Studi Kasus Subak Cepik Desa Tajen Kecamatan Penebel Kabupaten Tabanan) (Farmers' Willingness to Pay for Implementing Rice Farming Business Insurance (AUTP) (Case Study of Subak Cepik, Tajen Village, Penebel District, Tabanan Regency)). *Jurnal Agribisnis dan Agrowisata*, *7*(3), 364-373, doi: 10.24843/JAA.2018.v07.i03.p05.

Wenner, M., & Diego, A. (2003). Agricultural Insurance in Latin America: Where Are We? ASKMI, Asian Knowledge Centre for Mutual Insurance, -- available at: www.findevgateway.org/sites/default/files/publications/files/mfg-en-case- study-risk-management-pricing-insurance-guarantees-agricultural-insurance-in- latin-america-where-are-we-2003_0.pdf.

World Bank (2010). Agricultural Insurance in Latin America, Developing The Market (English). Report No. 61963-LAC. Washington DC: World Bank, -- Available online at: http://siteresources.worldbank.org/FINANCIALSECTOR/Resources/Agricultur al_insurance_in_LAC_web_FINAL.pdf.

Yanuarti, R., Aji, J.M.M. & Rondhi, M. (2019). Risk aversion level influence on farmers' decision to participate in crop insurance: A review. *Agricultural Economics – Czech*, *65*(10), 481-489, doi: 10.17221/93/2019-AGRICECON.

Muhammad Yasir Yusuf
Departement of Islamic Economics, Faculty of Islamic Economics and Business Ar-Raniry Islamic State University, Indonesia.
E-mail: muhammadyasir@ar-raniry.ac.id
Doctor of Islamic Economics; Associate Professor at The Departement of Islamic Economics, The Faculty of Islamic Economics and Business, Ar-Raniry Islamic State University (UIN AR-RANIRY). In 2018, he was selected as a figure in sharia economics throughout Sumatra at the sharia economic festival in Lampung organized by Bank Indonesia. The author is also active as the Sharia Supervisory Board of Bank Aceh and has produced five books, namely Islamic Community Economic Institution (2004), Islamic Corporate Social Responsibility; Theory and Practice (2017), Guidelines for Buying and Selling in Islam (2018) and E-Commerce in Islam (2019), Discourse of Riba in Financial Transactions (2020).

Rahmat Fadhil
Universitas Syiah Kuala, Indonesia.
E-mail: rahmat.fadhil@unsyiah.ac.id
Rahmat Fadhil is a senior lecturer in Agricultural Engineering and Agroindustrial Engineering at Syiah Kuala University, Aceh - Indonesia. His research interest and lectures are in Food Engineering, Post Harvest Technology, Sensory Evaluation, System Engineering, Aquaculture Engineering, Election, and Public Policy. He is also an active member of the International Association of Acehnese Scholar (IAAS), Asia-Pacific Chemical, Biological, and Environment Engineering Society (CBEES), International Association of Engineers (IAENG), Indonesian Society of Agricultural Engineering (Perhimpunan Teknik Pertanian Indonesia/PERTETA), Indonesian Aquacultural Society (Masyarakat Akuakultur Indonesia), Jaringan Survey Inisiatif (JSI) and Society for Indonesian Biodiversity. In addition, he has been appointed as an editor and reviewer in many academic journals and conference, for instance Aceh Scientific Journal, Rona Teknik Pertanian, Journal of Agroindustrial Technology, Journal of Agricultural Engineering and Biosystem, PLANTA TROPIKA: Jurnal Agrosains (Journal of Agro Science) and Aceh Development International Conference (ADIC).

T. Saiful Bahri
Universitas Syiah Kuala, Indonesia.
E-mail: tsaifulbahri@unsyiah.ac.id
T. Saiful Bahri, a lecturer in the department of agribusiness studies at Syiah Kuala University with professional expertise in agricultural economics. The Author teach macroeconomics, microeconomics, agribusiness management, plantation management, and community development. In addition to teaching professional jobs, The Author once served as an economist and manpower expert on the Aceh aceh development planning agency, agriculture manager of the Aceh - Nias Rehabilitation and Reconstruction Agency (BRR NAD - Nias).

Hafiizh Maulana
Department of Islamic Economics, Faculty of Islamic Economics and Business Ar-Raniry Islamic State University, Indonesia.
E-mail: hafiizh.maulana@ar-raniry.ac.id
Master of Planning and Public Policy; Lecturer at The Faculty of Islamic Economics and Business, Ar-Raniry Islamic State University (UIN AR-RANIRY). Research activities for the last 5 years consisted of: Experts for the Study of the Establishment of a Logistics Distribution Center with DISPERINDAG Aceh (2017), the Expert Team for the Establishment of BPRS Gerbang Raja Sejati Aceh Jaya Distric (2018), Expert Team for Academic Draft preparation plans for the establishment of an Aceh-owned company PT. Aceh Sharia Financing Guarantee at the Aceh Economic Bureau (2019), Sensus Muzakki and Mustahik Baitul Mal Aceh Research Team (2019), Bank Indonesia Consultant Team for Mosque-Based Economic Empowerment (2020).