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FACTORS AFFECTING FARMERS' RESPONSES TO THE USE OF COMBINE HARVESTERS IN VILLAGE MATANG PUNTONG, SEUNUDDON DISTRICT

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Abstract

This research was conducted in Village Matang Puntong, Seunuddon District, North Aceh Regency. This study aims to determine wheter the factors of land area, level of education, labor skills and loss of yields can affect farmers responses to the use of rice harvesting machines (Combine harvester) in Gampong Matang Puntong, Seunuddon District. The research methoud used is a survey method with a questionnaire as a tool. Sampling using simple random sampling with a total sample of 50 respondents. Data analysis using Likert scale and Multiple Linear Regression using SPSS software. the results of this study indicate that simultaneously (F test) shows that the factorsofland area, education level, Experience, labor expertise and crop loss have a significant effect on farmers responses. The results of partial test analysis (t test) showed that the factors of land area, experience and yield loss had a significant effect on farmers responses, while the level of education and labor expertise had no significant effect on farmers responses to the use of rice harvesting (Combine harvester) in Village Matang Puntong, Seunuddon District.

***Key words**: farmer response, agricultural mechanization, combine harvester, rice, influencing factors.*

1. PRELIMINARY

The agricultural sector is one sector that needs attention from the government, because most of Indonesia's population is farmers. In the national development framework, the agricultural sector plays an important role because apart from providing food for the entire population, it is also the mainstay of foreign exchange contributors from the non-oil and gas sector. Rice or rice is very important for the Indonesian economy, besides being a staple food for the Indonesian people, it is also a source of income for most farmers. The need for rice is increasing because the population is increasing, this situation encourages the government to look for new breakthroughs to increase mass rice production, namely implementing various systems in various regions throughout Indonesia (Rozalina and Tausiah, 2015).

A fundamental change in the agricultural system is needed to improve the quality or quantity of agricultural products. One way is to change the traditional agricultural system to a modern agricultural system. One way to shift or shift this system is to use modern agricultural equipment or machinery to complete agricultural work. Agricultural mechanization is one way to cultivate land, reduce yield losses and increase timeliness and agricultural activities (Gunawan, 2014).

Rice harvesting machine (Combine harvester) is a new breakthrough tool that can help streamline and streamline the rice harvesting process. The use of modern rice harvesting machines only takes approximately 3 hours to harvest 1 hectare of rice depending on the condition of the paddy fields. Farmers who harvest with the traditional system of course need about 32 harvest workers and 12 workers who transport rice that has been cut (nibai) with an area that is usually carried out approximately one hectare per half day so that the costs incurred by farmers are not a little.

Seunuddon District is one of the sub-districts in North Aceh which is a rice-producing area and its production reaches 12,196 tons, where farmers in Seunuddon District have familiar with the

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use of harvesting machines. There are some who have used rice harvesting machines and some are still harvesting traditionally. One area that has used a lot of harvesting machines in Seunuddon District is Gampong Matang Puntong. The use of rice harvesting machines to avoid farmers if there is a shortage of labor during the harvest season, the costs incurred are more efficient and time efficient. Farmers who respond to the use of rice harvesting machines (Combine harvesters) in Matang Puntong Village are a community consisting of various kinds of differences. With these differences, it will cause differences in responding to the use of harvesting machines. These differences include the area of land owned by farmers, level of education, experience, labor skills and loss of yields. For this reason, the author wants to know the factors that influence farmers' responses to the use of rice harvesting machines in Gampong Matang Puntong, Seunuddon District.

2. LITERATURE REVIEW

Response comes from the word response, which means an answer, reply or action in the large Indonesian dictionary, response means response, answer or reply. Response is also a person's attitude or behavior in responding to a communicant process when receiving a message that is shown to him. Response can also be interpreted as feedback that has a very large role or influence in determining whether or not the communication is good. Responses or feedback are those that have a major role or influence in determining whether or not the message is good (Subandi, 2015).

Agricultural mechanization in the sense of Agriculture engineering includes the application of technology and management of the use of various types of agricultural machinery, ranging from land cultivation, planting, water supply, fertilization, plant care, harvesting of produce to products that are ready to be marketed. From its objectives, the application of agricultural mechanization is intended to handle jobs that are not possible to do manually, increase the productivity of human resources, be efficient in the use of production inputs, increase productivity and quality and provide value for users. The application of agricultural mechanization leads to support from various elements, such as professional manpower in the fields of management, engineering/mechanics, operators, availability of workshops, availability of fuel, lubricants, spare parts, and the availability of other supporting elements, which are requirements for agricultural mechanization to be able to developed and felt the benefits in accordance with the objectives of agricultural modernization (Gunawan, 2014).

A rice harvesting machine (Combine harvester) is a rice harvesting tool that can cut the grains of standing plants, thresh and clean the grain while walking in the fields. Thus the harvest time is shorter when compared to using manual labor (humans) and does not require labor that is labor intensive. large as traditional harvest. The use of rice harvesting machines requires a large investment and trained workforce to be able to operate this tool (Barokah in Alfajri, 2015).

Rozalina and Tausiah (2015) with the title "Factors Affecting Farmers' Responses to the Use of Rice Power Thresher (Oryza sativa L.) in Peunaron District, East Aceh Regency. The analytical method used is Likert and multiple linear regression. The results of this study indicate that the average age of paddy rice farmers is 41.23 years, with an education period of 10.46 years, farming experience 9.57 years and an average family size of 4.00 people. The average area cultivated by rice farmers is 0.83 Ha. Calculation of the coefficient of determination R2 = 0.921, which means that the variation on the rise and fall of farmers' responses in the use of rice thresher machines (Y) is influenced by land area (X1), education (X2) and experience (X3) of 92.10% and the remaining 7.90 % is influenced by other variables outside the model. Then simultaneously that the area of arable land, education and experience of farmers simultaneously have a very significant effect on the response of farmers in the use of rice thresher machines (Power thresher). Partially the area of arable land, education and experience have a very real effect on the response of farmers in the use of rice thresher (Power thresher).

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3. RESEARCH METHODS

This research was conducted in Village Matang Puntong, Seunuddon District. This determination was carried out by purposive sampling with the consideration that Gampong Matang Puntong is one of the farmer villages that uses rice harvesting machines in Seunuddon District. The total population in this study was 102 farmers. The sampling technique in this study used the Simple Random Sampling (Sugiyono, 2018). Furthermore, the determination of the sample size in this study used the Slovin formula and the error rate was 0.1 (10%) (Sugiyono, 2018).

Slovin's formula:

$$n = \frac{N}{1 + N\,(e)^2}$$

$$n = \frac{102}{1 + 102\,(0{,}10)^2} = \frac{102}{2{,}02} = 50{,}4 \text{ (rounded up to 50 farmers)}$$

Description :
N = Amount population
n = Amount samplel
e = Error rate

The types of data used in this study are descriptive qualitative and quantitative. The sources of data collected in this study include primary data and secondary data. The method used in analyzing the data is descriptive qualitative method which is carried out on data in the form of descriptive interpretation or interpretation to measure farmer responses. on the use of harvesting machines and labor skills. This score uses a Likert scale. The scale made is a scale of 1 to 4, which is expressed through words for example: strongly agree (SS) is given a score of 4, Agree (S) is given a score of 3, disagree (KS) is given a score of 2 and disagree (TS) is given score 1 (Natsir, 2013).

To determine the factors that influence the response of farmers to the use of harvesting machines (Combine harvester), Multiple Linear Regression Analysis is used. The systematic multiple linear regression equation can be written as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e$$

Description :
Y = Farmer's response to the use of a harvester (Combine harvester) (Score)
a = Constant
$b_{1\text{-}5}$ = Regression coefficient
X_1 = Land area (Ha)
X_2 = Education level (Years)
X_3 = Experience (Years)
X_4 = Labor Skills (Score)
X_5 = Loss of Yield (dummy)
(0 = lost crops, 1 = no loss of crops)
e = Standard error

To partially test the effect of the independent variable on the dependent variable, the t-test was used. The t-test is a partial test of the effect of the independent variable on the dependent variable. It is used to determine whether the independent variable partially has a significant effect or not on the dependent variable. The significant tariff used is 5%.

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The test criteria are:

If sig. t < 0.05 then H_0 is rejected and H_a is accepted.

If sig. t > 0.05 then H_0 is accepted and H_a is rejected

If H_0 is accepted, it means that X_1, X_2, X_3, X_4 and X_5 partially have no significant effect on Y (farmer's response).

If H_a is accepted, it means that X_1, X_2, X_3, X_4 and X_5 partially have a significant effect on Y (farmer's response).

To simultaneously test the effect of the independent variables on the dependent variable, the F test is used. The F test is a test that simultaneously or simultaneously has a significant effect on changes in the independent and dependent variables. This means that the parameters X_1, X_2, X_3, X_4 and X_5 are simultaneously tested whether they are significant or not.

The test criteria are:

If sig. F < 0.05 then H_0 is rejected and H_a is accepted.

If sig. F > 0.05 then H_0 is accepted and H_a is rejected.

If H0 is accepted, it means that X_1, X_2, X_3, X_4 and X_5 simultaneously have no significant effect on Y (farmer's response).

If Ha is accepted, it means that X_1, X_2, X_3, X_4 and X_5 simultaneously have a significant effect on Y (farmer's response).

The coefficient of determination is a statistical value calculated from the sample data. This coefficient shows the percentage of variation of all dependent variables explained by the independent variables. This coefficient is a measure of the extent to which the independent variable can change the dependent variable in a relationship. The coefficient value of R^2 ranges from $0 < R^2 < 1$, with the test criteria being that the higher R^2 (closer to 1) indicates the model formed is able to explain the dependent variable, and vice versa (Supriana, 2013). To see the magnitude of the coefficient of determination, the following formula is used:

$$(R^2) = \frac{JKreg}{\sum Y^2}$$

Description :

R^2 = Coefficient of determination

Jk reg = Sum of regression squares

Y^2 = Sum of total squares

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4. RESULTS AND DISCUSSION

Farmer Characteristics

Characteristics of Farmers The characteristics of farmers in this study are based on age, number of dependents, education level, experience, land area, average characteristics can be seen in Table 1 below:

Table 1. Characteristics of Farmer Respondents

No	Characteristics	Range		Average
		Low	Tall	
1	Age	29	66	45,84
2	The number of dependents	1	7	2,86
3	Level of education	6	16	8,84
4	Experience	5	33	14,98
5	Land area	0,1	0,47	0,27

The average age of farmers who respond to the use of harvesting machines is 45.84 years or 46 years, this age is still classified as productive age. Age is one of the factors that influence farmers in running their farms. The average number of dependents of farmers in the study area is 2.86 people or 3 people. The number of dependents is very helpful for farmers in farming if family members are of productive age and help with farming activities. The average level of education of farmers in the research area is 8.84 or 9 years. This means that farmers who use rice harvesting machines in Matang Puntong Village are still relatively low. The average experience of farmers in the research area is 14.98 or 15 years. This shows that the longer the farmer is in farming, the more likely the better the management of his farm. However, the longer farmers work, not all farmers are able to accept the use of rice harvesting machines due to the age of the farmers. The average area of farmers' land in the study area is 0.27. This means that with a large area of land owned by farmers, the more production will be obtained by farmers. Farmers in Matang Puntong Village tend to prefer to use rice harvesting machines if the land area is large. There are also some farmers who have small land areas also use harvesting machines. Because it does not require a lot of manpower.

Statistic test

Table 2. Results of Multiple Linear Regression Analysis

Variable	Regression coefficient	t-count	significant
Constanta	15,042	11,151	,000
Land Area	5,095	3,798	,000
Level of education	-,056	-1,247	,219
Experience	-,069	-3,547	,001
Labor expertise	,100	,703	,486
Lost crop	2,215	7,695	,000
R^2 = ,668			
F sig = 000			

Based on the table above, it can be obtained the results of the analysis of multiple linear regression calculations of the factors that influence the response of farmers to the use of rice harvesting machines in Village Matang Puntong, Seunuddon District, the test carried out by t test can be explained partially by the influence of the independent variable on the dependent variable as follows:

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Land Area

The results of the analysis of the value of the regression coefficient of land area have a positive value of 5.095. This shows that for every 1 hectare increase in land area variable, the response of farmers to the use of rice harvesting machines will increase by 5.095, assuming other variables are held constant.

The significant value of land area is 0.000 which is smaller than the error rate at = 0.05, then Ha is accepted and H0 is rejected, so that the variable land area has a significant effect on farmers' responses in the use of harvesting machines. In this study the use of rice harvesting machines is very helpful for farmers, because with a large land area owned by farmers it does not require a lot of labor to carry out the harvesting process, at this time manual labor is also very difficult to obtain. This is in line with the research of Dewi and Wawan (2021) which states that land area has a significant effect on farmers' responses to the use of agricultural mechanization. The wider the farmer's land, the higher the response of the farmers to use the machineries, given the scarcity of labor and farm laborers at this time.

Level of education

The results of the analysis of the regression coefficient value of the education level are negative at 0.056. This shows that for every 1 year increase in the education level variable, the response of farmers to the use of rice harvesting machines will decrease by 0.056, assuming other variables are held constant.

The significant value of the level of education is 0.219, which is greater than the error rate at = 0.05, then Ha is rejected and H0 is accepted, so that the education level variable has no significant effect on farmers' responses in the use of harvesting machines. Based on the results of interviews with farmers, it can be seen that farmers who have low levels of education still apply how to manage their farming according to their own mindset, because the knowledge they get is still lacking. This is in line with the research of Listiana et al (2020) which states that all respondents have taken education although it is still in the low category. Education is a person's effort to improve formal abilities, and education also influences a person's way of thinking, attitudes and behavior in accepting and understanding new innovations and technologies.

Experience

The result of the analysis of the experience regression coefficient value is negative at 0.069. This shows that for every 1 year increase in the experience variable, the response of farmers to the use of rice harvesting machines will decrease by 0.069, assuming other variables are considered constant. The regression coefficient is negative, which means that the longer the experience of the farmer, the older he is, making it difficult to accept new innovations or the use of harvesting machines.

The significant value of experience is 0.001 which is smaller than the error rate at = 0.05, then Ha is accepted and H0 is rejected, so the experience variable has a significant effect on farmers' responses in using harvesting machines. In this study, the experience of young farmers having good knowledge but lacking in experience and skills, while older farmers tend to be less understanding of new technology but their understanding will be better in farming. This is in line with the research of Rozalina and Tausiah (2015) which states that experience has a significant effect on farmers' responses to the use of rice thresher machines.

Labor expertise

The results of the analysis of the regression coefficient of the expertise of the workforce have a positive value of 0.100. This shows that for every 1 unit increase in the skill of labor, the response of farmers to the use of rice harvesting machines will increase by 0.100, assuming other variables are held constant.

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The significant value is 0.486, which is greater than the error rate at = 0.05, then Ha is rejected and H0 is accepted, so that the variable of labor expertise has no significant effect on farmers' responses in the use of harvesting machines. This is because the expertise of the workforce who operates the rice harvesting machine is already trained to harvest rice properly. The lack of accuracy of the harvesting machine operator will cause the quality of the grain obtained by farmers to be less good, because when the rice is put into the straw sack, it also enters. Then the damage to the farmers' rice fields was also caused by the expertise of the workforce and the loss of crops due to the poor machine operator. This statement is in line with Sari's research (2017) which states that the use of this rice harvesting machine can only be operated by certain people.

Crop Loss

The results of the analysis of the regression coefficient of crop loss have a positive value of 2.215. This shows that when there is not much loss of crop yields, the response of farmers to the use of rice harvesting machines will increase by 2,215.

The value of significant crop loss is 0.000 less than the error rate = 0.05 then Ha is accepted and H0 is rejected, so that the variable yield loss has a significant effect on farmers' responses in the use of harvesting machines. This is because by using a rice harvesting machine, not much rice is scattered at the time of harvesting because after cutting the sacks are directly inserted, whereas if using the traditional system a lot of rice is scattered during cutting and transporting the rice stalks. This statement is in line with Hidayat's research (2019) which states that the use of a Combine harvester machine can increase rice productivity through less spillage of rice yields at the time of harvesting.

The test results of the calculated F sig value of 0.000, smaller than the error rate at = 0.05, then Ha is accepted and H0 is rejected. This shows that land area, level of education, experience, labor expertise and loss of crop yields simultaneously have a significant effect on farmers' responses to the use of rice harvesting machines in Gampong Matang Puntong, Seunuddon District.

The results of the test value of R Square value of 0.668 which means that the variation in the ability of the independent variables (land area, education level, experience, labor expertise and crop loss) is able to explain the variation of the dependent variable (farmer response) by 66.8%, while the rest is 33.2% is explained by other variables outside the model.

5. CONCLUSIONS AND RECOMMENDATIONSConclusion

Simultaneous analysis results (F test) showed that the factors of land area, education level, experience, labor expertise and crop loss had a significant effect on farmers' responses. The results of the partial test analysis (t test) showed that the factors of land area, experience, and crop loss had a significant effect on farmers' responses, while the level of education and labor expertise had no significant effect on farmers' responses to the use of rice harvesting machines (Combine harvester) in Gampong. Matang Puntong, Seunuddon District.

Suggestion

1. It is hoped that rice farmers who have used a rice harvesting machine (Combine harvester) can socialize to other farmers about the advantages and convenience of using a rice harvesting machine (Combine harvester).
2. The government should make policies or training for harvesting machine operators so that machine operators can have good workforce skills in operating harvesting machines.

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