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THE IMPACT OF AGRICULTURAL LAND CONSOLIDATION ON RICE FARMING PRODUCTION AND INCOME OF IN SUKOHARJO REGENCY

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ABSTRACT

This study aims to determine the implementation of land consolidation of rice farming in Sukoharjo Regency in terms of physical and management consolidation, the effect of land consolidation on production, income, and risk of rice farming income. The research location is determined by the purposive sampling method. The sampling method of thisresearch was a simple random sampling of 30 farmers participating in the consolidation. Descriptive analysis was usedto determine the implementation of physical consolidation and risk farming management consolidation, while to determine the production, income, and income risk, quantitative and statistical analyzes were used. The consolidationimplementation's analysis shows that land consolidation in Sukoharjo Regency has been carried out physically and inmanagement, but some indicators have not been implemented. The average production of farmers before consolidation was 14.424,49kg/ha/year, while after consolidation, it was 14.829,40 kg/ha/year. The average income of farmers' ricefarming was higher after consolidation, IDR 44.516.782/ha/year, and IDR 41.654.356/ha/year for before consolidation. The income risk of rice farming in the Sukoharjo Regency is high before consolidation, was 73.02%, while after consolidation was 74.42%.

Keywords: farm management consolidation, income, income risk, physical consolidation, production

INTRODUCTION

Food is a basic need for humans that helps provide energy to do the activities. There are many types of food plants, one of which is rice. Rice is a staple food ingredient for Indonesian. Data from the Central Statistics Agency (2018) showed that in 2017 the largest percentage of monthly average per capita expenditure according to goods groups in Indonesia is expenditure on food items such as grains, amounting to 5.39%.

The main food production for rice in Indonesia from 2014 to 2017 has increased every year. Ministry of Agriculture data (2019) shows that the amount of rice production in 2014 was 70.846 tons; 75.398 tons in 2015; 79.355 tons in 2016, and 81.149 tons in 2017. This increase in production is expected to meet Indonesia's food needs and the rapidly growing population. This improved production is expected to reduce rice imports or achieve food self-sufficiency.

In 1986, Indonesia received an award from FAO for achieving food self-sufficiency. Indonesia experienced an increase in imports in 2016 and 2018, while in 2017, there was a significant decrease in the volume of rice imports. The number of rice imports in Indonesia in 2015 amounted to 505,309.999 tons; 997,709.858 tons in 2016; 127.227 tons in 2017, and 1,801,262.011 tons in 2018 (Ministry of Agriculture, 2019). The increase in rice production in Indonesia has not been able to meet the national demand for food, resulting in price hikes that have caused the government to import rice.

Domestic production is expected to meet people's food needs. Production is influenced by several factors, one of which is land area. The area of agricultural land (rice fields) has decreased from year to year. The area of paddy fields in 2013, according to the Decree of the Head of BPN-RI No.3296 / Kep-100.18 / IV / 2013 dated 23 April 2013, amounting to 7,750,999 ha and in 2018, according to the Decree of the Minister of ATR / Head of BPN-RI No.399 / Kep-23.3 / X / 2018 dated 8 October 2018 amounting to 7,105,145 ha (Ministry of Agriculture, 2019). A decrease in the agricultural land area can occur due to land-use change or land conversion. Apart from land conversion, the problem faced by Indonesian farmers at this time is land fragmentation due to the inheritance and buying and selling systems that exist in the community.

Fragmentation and land-use change that continues to be carried out causes Indonesian farmers, on average, to have a narrow area of land so that the production costs are higher. Another problem is the limited education that farmers have, which affects the absorption of technology, the lower interest of the younger generation in agriculture, and the lack of capital to purchase production facilities, especially for the purchase of seeds, fertilizers, and pesticides whose prices are

getting higher and higher. To solve agricultural problems, the Ministry of Agriculture issued various policies and work programs.

The Directorate General of Agricultural Infrastructure, Ministry of Agriculture launched a farmland consolidation program in 2009 to increase food crop production and reduce fragmentation and conversion of agricultural land. This program is implemented in Boyolali Regency, Sukoharjo Regency, Gianyar Regency, and Denpasar City (Wahyuni and Tri Pranadji, 2015). In 2015 an implicit consolidation-based program was implemented in Sukoharjo Regency, namely Modern Agricultural Pilot Project (Ditjen PSP, 2015).

Based on this background, the authors are interested in research to determine the implementation of physical consolidation and farm management, to determine the effect of agricultural land consolidation on production, income, and risk of rice farming income in Sukoharjo Regency.

METHOD

The research method used is in descriptive research, namely the method used to examine human groups' status, objects, conditions, systems of thought, and events in the present (Nazir, 2011). This study did not use the control or manipulation of research variables. This descriptive study used a survey method. This survey method aims to dissect and identify problems in events taking place in the field. The survey method in this study was carried out by using a sample.

The research location was determined purposively by considering the objectives of the study. The research location is in Dalangan Village, Tawangsari District, Sukoharjo Regency, Central Java Province. Dalangan Village is one of the locations for the 2015 modern agricultural pilot program.

The population in this study were all farmers participating in land consolidation in Sukoharjo Regency. The sample is 30 farmers who own tenants before and after consolidation who are participants in the consolidation of agricultural land and joined the Bagya Mulya Gapoktan in Dalangan Village, Tawangsari District, Sukoharjo Regency. The sample was obtained using the simple random sampling method, namely random sampling.

The data analysis methods used in this research are:

1. Consolidated Implementation Analysis

This study used a descriptive qualitative method. Descriptive research describes and describes the research object's current state based on facts in the field (Moleong, 2008). The descriptive analysis used in this study compares the implementation of physical consolidation with technical guidelines and compares rice farming activities on consolidated land in Sukoharjo Regency before and after land consolidation.

2. Farm Production Analysis

Production is the ability of an area of land to produce output, namely lowland rice in kg (Hasyim, 2006). Production is obtained by weighing the output with a weighing machine. Farmers in Sukoharjo Regency sell rice by weighing and cutting. Production on the land that is cut is carried out by the tiling method, which is carried out by farmers so that the farmers have data on the production results of their land. In thisstudy, a different t-test was used to analyze rice farming production before and after consolidation. The value of rice farming was statistically tested to compare the average values obtained were the same or not. The t-test used was a paired-sample t-test, and the significance level used was 5 percent.

3. Farm Income Analysis

The revenue of rice farming can be determined using the following equation model (Suratiyah, 2015) :

$\Pi = TR - TC$
$TC = TFC + TVC$
$TR = P \times Q$ .....(1)

Based on Pappas and Hirschey (1995), income is obtained from the difference between revenue and operating costs.

Operating cost = production cost + labour outside family cost + other costs (example: tax, water, repair the agriculture tools) + depreciation cost
Income = TR – Operating Cost (2)

In which:
TR = Total revenue
P = Output price
Q = Total output
TC = Total cost
TFC = Total fix cost
TVC = Total variable cost

In this study, the t-test difference test was used to analyze rice farm income before consolidation. The value of rice farming income is statistically tested to compare the average value obtained is the same or not. The t-test used was a paired-sample t-test.

4. The Risk of Rice Farming Income Analysis

Rice farming income risk can be determined by the following formula (Somantri and Muhidin, 2006):

$$CV = \frac{\sigma}{\bar{X}} \times 100\% \text{.....} \quad (3)$$

In which:
CV = income variance coefficient
σ = standard deviation of income
$\bar{X}$ = average income

Income risk categories as follows (Hernanto, 1993):

$CV \geq 0.5$ = high risk
$0.2 \leq CV < 0.5$ = medium risk
$CV < 0.2$ = low risk

In this study, the t-test difference test was used to analyze the magnitude of the risk of rice farming income before consolidation and after consolidation. The value of rice farming income is statistically tested to compare the average value obtained is the same or not. The t-test used was a paired-sample t-test.

RESULTS AND DISCUSSION

1. The Consolidated Implementation

Rice farming is the leading business for most of the population in the Tawangsari District. In 2015, the farmer group association (Gapoktan) Tani Mandiri was chosen as a pilot location for modern agriculture. The modern agricultural pilot's essence is agricultural mechanization, including machinery and land consolidation, corporate management, and environmentally friendly agriculture integrated with livestock and compost factories. The implementation of land consolidation was carried out for two months by holding six meetings between the Tani Mandiri Farmers Association and the farmers.

Land consolidation is carried out by rearranging the location of the fields. Land consolidation is carried out by forming paddy fields into 3 ha for one bund and adjusting to existing farming roads, irrigation systems, and primary drainage. The land that has been combined is still bounded in the form of a rope to determine the area of land tenure.

In the indicator of impermeable layer repair planning (hardpan) was not carried out by Gapoktan because of the limited tools owned by Gapoktan. An impermeable layer on the soil can form naturally because it is used as agricultural land for a long time. The irrigation system in paddy fields is technical irrigation so that the existing primary and secondary irrigation channels do not experience changes, but the tertiary irrigation channels are re-adjusted. The existing primary irrigation and drainage system is a continuation of the Gajah Mungkur Reservoir development in Wonogiri to control floods that often occur in the Sukoharjo Regency to irrigate agricultural land. Primary irrigation and drainage systems are not changed due to limited funds and time owned by farmers.

Land consolidation changes 3 out of 7 farming activities carried out together, namely nursery, land management, and planting, while maintenance, harvesting, post-harvest, and marketing have not been carried out jointly. The government in 2017 has assisted in the implementation of management consolidation, but in its implementation, it still faces several obstacles, such as the desire of farmers to manage their land.

Land processing is carried out jointly both before and after consolidation because, in Sukoharjo Regency, it has been a long time since using tractors to cultivate the land. The nursery is carried out by mothers who are supervised by Gapoktan Tani Mandiri and Agricultural Machinery Services Business (UPJA) Bagya Mulya so that each farmer does not need to do a nursery and care for it to become a seed. Planting in land consolidation is carried out jointly, both the planting schedule and the seeds used and managed by UPJA Bagya Mulya. UPJA Bagya Mulya manages to plant because rice cultivation in Sukoharjo Regency has changed from manual to mechanized, using a rice transplanter.

Maintenance includes fertilizing, weeding, and eradicating pests independently. Farmers decide for themselves what to do with their crops, such as fertilizers and pesticides used, the volume of fertilizers and pesticides, and types of fertilizers and pesticides.

Harvesting in Sukoharjo Regency is carried out using a rice transplanter and a power threader. Harvesting is done independently, but the harvest schedule is determined through deliberations between the farmers and UPJA Bagya Mulya as the agricultural equipment business owner. In Sukoharjo Regency, not all farmers harvest their products independently because some farmers choose to sell by cutting, especially in the second planting season.

Harvesting activities significantly affect rice marketing activities in Sukoharjo Regency because marketing is still carried out individually in line with harvests that are still carried out individually. Marketing in Sukoharjo Regency is carried out by cutting sales and selling dry unhulled rice directly on the land so that farmers rarely incur additional transportation costs when selling their crops. The government has been trying to realize joint marketing by building a rice mill in Sukoharjo Regency.

Based on the research results, land consolidation in Sukoharjo Regency has been carried out physically and in management. Physical consolidation has been done by combining small plots into larger plots, namely 3 ha. Management consolidation is carried out at the seeding, planting, and land cultivation stage, while maintenance, harvesting, post-harvest, and marketing activities are carried out independently. It can be concluded that the consolidation has been carried out physically and management, but the implementation has not been perfect.

The incomplete consolidation is very influential on the performance of rice farming. In the maintenance process that has not been carried out jointly, there is no uniformity in the use of production facilities. Harvest and post-harvest, which are carried out independently, cause differences in farming costs incurred by farmers. Harvesting done by cutting does not require harvest costs, but rice prices will be lower than farmers who harvest and post-harvest and sell their crops in dry unhulled rice. This situation affects rice farming yield for each farmer, and the income of rice farming also varies due to various production costs and selling prices.

2. Rice Farming Production

Farmers' production in Sukoharjo Regency is determined by weighing and using the tiling method. The tiling method is used by farmers to determine the total yield of the slash so that farmers do not experience losses due to ignorance of the amount of production from the rice farming they manage. The price received by farmers for their rice production results can be determined through a cut and the price that applies in the market. Farmers also look at their land's fertility level and compare it with another land bought by redeemers. In this study, farm produce is sold in harvested dry unhulled rice (GKP), usually sold directly.

Table 1. The Average Rice Production Before and After the Consolidation in Sukoharjo Regency

Season	Before Consolidation		After Consolidation	
	Production per Rice Farming	Production per Ha (Kg/Ha)	Production per Rice Farming	Production per Ha (Kg/Ha)
Season 1	2,591.43	5,920.57	2,670.33	6,101.30
Season 2	3,722.17	8,503.92	3,820.00	8,728.10
Total	6,313.60	14,424.49	6,490.33	14,829.40

Source: Primary Data Analyzed in 2018

Based on table 1, it can be seen that the production after the consolidation is higher than before consolidation. Rice production before consolidation was 2,591.43 per farm or 5,920.57 per ha in season 1, and season 2 was 3,722.17 per farm and 8,503.92 per hectare. After consolidation, the production increased to 2,670.33 farms or 6,101.30 per hectare in season 1, and in season 2, it was 3,820 per farm or 8,728.10 per hectare.

The results of farmers' production were carried out by the paired-sample t-test. It can be seen that the sig-2tailed value is 0.000, which means it is smaller than the alpha value of 0.05. It means that H0 is rejected; that is, the average production before and after the consolidation is not significantly different. It can be concluded that the second hypothesis of this study is accepted, namely that land consolidation significantly increases rice production.

3. Rice Farming Income

Rice farming income is obtained by subtracting gross revenue from farming costs, including labor costs, production facilities costs, depreciation costs, and other costs (land tax, water fees, production sharing, and repair of agricultural tools). The reduction in farming costs, both the cost of production facilities, labor costs, equipment depreciation costs, and other costs and increased income due to increased production, can increase farmers' income. The analysis of rice farming income can be seen in table 2.

Table 2 shows that income before consolidation was lower than after consolidation, namely Rp.41,654,356 lower than Rp.44,516,782. The increase in income is seen after consolidation caused by an increase in revenue and a decrease in costs. Increased revenue from Rp 61,908,317 to Rp 64,162,300 and decreased total costs from Rp 20,253,961 to Rp 19,645,518. After consolidation, the cost of farming that has decreased is the labor cost, due to the shift of farmers from human labor to using more machines. Machine power is used in the process of planting, tillage, and harvest.

The t-test statistical calculation on the average income per hectare of farmers before and after consolidation shows that the 2-tailed sig value is 0.000, which means it is less than the alpha value of 0.05. These results indicate that farmers' average income after and before consolidation is significantly different (H0 is rejected).

Table 2. The Structure of Rice Farming Cost and Income per Hectar per Year Before and After the Consolidation inSukoharjo Regency

Component	Before Consolidation	After Consolidation
Total Revenue	61,908,317	64,162,300
Total Cost	20,253,961	19,645,518
Labour Cost	9,150,305	6,931,607
Production Cost	5,256,740	6,884,502
Depreciation Cost	96,611	98,107
Other Costs	5,750,305	5,731,302
Income	Rp 41,654,356	Rp 44,516,782

Source: Primary Data Analyzed in 2018

4. The Risk of Rice Farming Income

This study calculated the coefficient of variation of lowland rice farming income before consolidation and after consolidation. The results of the calculation of the coefficient of variation can be seen in table 3.

Based on table 3, it can be seen that the coefficient of variation in rice farming incomeafter the consolidation is higher than before consolidation, meaning that the risk level of rice farming income after the consolidation is greater than before consolidation. These results indicate that the fourth hypothesis is accepted or failed to be rejected. After consolidation, Rice farming has a higher risk than before consolidation because there are high-income variations after consolidation. Rice farming with consolidation has not been matched by insurance from the government. The increased land area due to consolidation will certainly impact the increasing production and income of rice farming. This situation also causes the risks faced to increase so that to overcome the bad situation. Thegovernment should carry out a consolidation accompanied by the management of agricultural insurance. If farmers are guaranteed agricultural insurance, farmers' rice farming continuity in a consolidated system will be more secure.

Table 3. The Coefficient of variation of Rice Farming Income Before and After the Consolidation in Sukoharjo Regency

Component	Before Consolidation	After Consolidation
Average income	41,654,356	44,516,783
Coefficient of variation (CV)	0.7302	0.7442
Income CV (%)	73.02%	74.42%
Risk category	High	High
Results of t-test		
Sig-t		0.91

Source: Primary Data Analyzed in 2018

Risk analysis is carried out on rice farming income before and after consolidation. The risk before consolidation is 73.02% and after the consolidation is 74.42%, which is greater than 50%, so that rice farmers in Sukoharjo Regency have a high risk if good farm management is not carried out. The increase in risk occurs due to increased income due to increased rice production due to land consolidation resulting in agricultural mechanization. The cost of production facilities after consolidation has increased. This increase is in line with the increase in the harvested area for rice. An increase in rice farming income has also accompanied the increase in farming risk after consolidation.

High-income risk is also followed by high income, namely the average income after the consolidation is higher than before consolidation. Kadarsan (1995) states that the greater the income, the greater the risk faced by farmers, and this level of risk can be controlled by implementing risk management by farmers.

The t-test statistical calculation on rice farming's risk before and after consolidation shows that the 2-tailed sig value is 0.91, which means it is smaller than the alpha value 0.05. These results indicate that farmers' average income after and before consolidation is not significantly different (H0 accepted).

CONCLUSIONS

The conclusions of this study are as follows:

1. Consolidation in Sukoharjo Regency has been carried out physically and in management. However, in its

implementation, activities carried out jointly include seeding, land cultivation, and planting, while maintenance, harvesting, post-harvest, and marketing activities are still carried out independently.

2. Land consolidation increases both levels of production and farm income. In addition, it also increases farm risks.

The suggestions given from this research are as follows:

1. The government should re-monitor the implementation of agricultural land consolidation both physically and in management to achieve business-scale farming objectives.
2. The government should provide special guidance to farmers who participate in land consolidation so that farmers understand that consolidation is not only eliminating rice field divider, but consolidation includes farm management such as maintenance (fertilization, pest control, weeding), harvesting, post-harvest, and joint marketing.
3. It is needed to implement a rice farming insurance program to protect farmers from high-risk farming.

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