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Strategi Adaptasi Petani Dalam Mengaplikasikan Mekanisasi Pertanian Pada Lahan Basah di Kabupaten Ogan Ilir Sumatera Selatan

Farmer Adaptation Strategies in Applying Agricultural Mechanization in Wetlands of Ogan Ilir Regency, South Sumatera

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ABSTRACT

Increasing food production, which is currently difficult to do on productive land with an extensification pattern due to limited land availability, causes the exploitation of wetlands with the category of lebak land (marginal land) to be an option for expanding food crops to increase food production in South Sumatra which has a lot of wetlands. Technological engineering is an option in overcoming the constraints of processing lebak land, especially in the use of agricultural tools and machinery which are still low in interest and adoption rates among farmers. This study aims to; (1) formulate strategies so that farmers are interested in cultivating lebak land into productive land, (2) formulate farmer adaptation strategies in cultivating lebak land by applying relevant technology. The survey method was used in this study with two layers of samples (farmers who used Alsintan and farmers who worked on the land manually), as many as 50 respondents in each layer (a total of 100 respondents) were taken using a simple disproportionate random method. Primary and secondary data obtained, processed to calculate income, tested for differences using paired sample t tests, the results of which became the basis for strategies to increase farmers' interest. Formulation of adaptation strategies using the SWOT method with the results of the study: (1) farmers who apply mechanization technology in cultivating rice in lebak land can do their farming with IP 200, incur lower production costs, and higher production and income than farmers who cultivate it manually; (2) The use of mechanization technology is still not efficient in the use of seeds, fertilizers, pesticides, so it must be optimized, (3) The adaptation strategy that must be carried out by farmers is an aggressive strategy because it is in quadrant I, which shows that rice farming in lebak land is in a strong position and has great opportunities to do. This strategy is the main strategy because the strength factors (S) and opportunities (O) owned by farmers in cultivating rice on lebak land have a value greater than the weakness factors (W) and threats (T) that will be encountered.

Keywords: *agricultural mechanization, paddy rice, wetlands*

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INTRODUCTION

Increasing food production is currently difficult to do on productive land with extensification patterns due to limited land availability for planting area expansion. In fact, from BPS data (2022), the increase in rice

harvest area to meet rice demand in Indonesia in 2022 is 194.71 thousand hectares or 1.87 percent wider than in 2021 (rice harvest area in 2022 is 10.61 million hectares, compared to rice harvest area in 2021 which is 10.41 million hectares). The same condition also occurs in the Province of South Sumatera, where data from the BPS of South Sumatra Province (2022) shows that the increase in rice harvest area in 2022 increased by 20.02 thousand hectares or 4.03 percent compared to the rice harvest area in 2021 which was 496.24 thousand hectares. The estimated additional harvest area per year is in line with the statements of Syahputra, et al (2019) and Rachmawati and Tarigan (2019), which estimate that in the future the additional rice field area we need to fulfill the main food production is no less than 20,000 ha more per year. This will be difficult to achieve if you only rely on rice production from irrigated and rainfed rice fields (Rahmi, et al, 2017, Wandansari and Pramitha, 2019). In addition to the decreasing area due to land use change, productivity is also increasingly difficult to increase.

To deal with this problem, one of the alternative solutions that is currently a priority for the government is the use of swampland, where one type is lebak swampland. Traditionally this land has been used for a long time by residents who live in areas that have wetland ecosystems such as in many areas in South Sumatra Province, one of which is Ogan Ilir Regency. In fact, lebak land is a type of land that is the main place for agricultural business in Ogan Ilir Regency (Rezeky, 2022). Optimization of wetlands with the category of lebak land which is often considered non-productive land is an option to be carried out in South Sumatra, especially in Ogan Ilir Regency, whose area is dominated by wetlands. However, the problem in the implementation of these efforts is constrained by the condition of the lebak land which requires extra effort to turn it into productive land. According to (Riswani et al., 2021), Technological engineering is an option in overcoming various obstacles in the processing of lebak land, especially in the use of agricultural tools and machinery which is still low in adoption rates among lebak rice farmers, due to the limited funds owned for the procurement of equipment and machinery as well as skills in their use.

Efforts to use this lebak land have actually begun to be carried out by the Ogan Ilir Regency Government. In 2020, it was recorded that the lebak land that has not been optimally empowered in Ogan Ilir Regency is an area of 15,125 Ha (Agriculture and Food Security Service of Ogan Ilir Regency and the Unsri Faculty of Agriculture Team, 2020). The level of agricultural production in the lebak swampland is quite productive, ranging from 4-6 tons of GKP per hectare, if this utilization is carried out optimally, then the fulfillment of food needs and increasing rice production from the intensification program can be achieved.

From the research of (Riswani et al., 2021), it was recorded that of the total lebak land that has been cultivated for food crops in Ogan Ilir Regency, 80% of it is for rice farming with a pattern of planting one-time rice a year (IP100). Meanwhile, what is cultivated twice a year is only about 20 percent. Thus, the opportunity for intensification in the lebak field is still possible. Such intensification can be carried out through increasing productivity per unit area, or by increasing the planting index (IP) from one time rice to twice in bio-physically possible areas. To support this effort, technological engineering is needed which is expected to provide solutions to various conditions of lebak land that have become inefficient to be cultivated with intensity more than once a year (Sari, 2018).

In addition to efforts to overcome water problems, the use of mechanization technology is also carried out, including the use of tractors for land treatment and the use of combine harvesters to assist in the implementation of harvests. According to (Suharjo, 2022), the use of agricultural tools and machinery such as hand tactors, rice transplanters, mini tractors, flad bed drayers, and other alsintan as a whole is able to significantly increase rice productivity. For rice farming in wetlands, the type of agricultural equipment and machinery most needed is a tractor. The use of hand tractors can help efficient use of work time and costs in processing land before planting in wetlands (Dewi, Langai and Supriyanto, 2021). Likewise, in post-harvest activities, where (Pratiwi, Sudarti and Prihandono, 2022) stated that the rice drying process using a distilling machine has a very real effect on harvest quality, harvest weight, and rice selling price.

Based on these conditions, this study aims to formulate strategies that must be carried out so that farmers are interested and can adapt in cultivating lebak land by applying relevant technology based on the calculation of productivity and income to be obtained.

RESEARCH METHODS

This research was carried out in Kabupaten Ogan Ilir, Sumatra Province, which was purposively chosen because this district is one of the food crop-producing areas in South Sumatra which has high wetland potential and there are still many that have not been cultivated into productive activities by farmers. Of the 16 sub-districts in Ogan Ilir Regency, Rantau Panjang District was chosen to represent this regency, because it has variations in lebak land that are relevant to the purpose of this study. This research used an analytical descriptive design, with a choice of survey methods. Respondent which is the primary data source was taken using the *Disproportionate Random Sampling* method because there is a distant inequality between the two populations used. The first layer sample is farmers who do farming on lebak land manually, while the second layer is farmers who do rice farming using agricultural production equipment *(tractor* and *combine harvester*), with each layer as many as 50 people (total respondents 100 farmers)**.**

The data collected in this study are primary and secondary data. Primary data are obtained by means of observation and direct interviews in the field with sample farmers, based on a prepared list of questions. Secondary data were obtained from related agencies such as BPS of South Sumatra Province and BPS of Ogan Ilir Regency, Agriculture and Food Crops Office of Ogan Ilir Regency, as well as from various previous library or literature sources related to this research.

The data obtained from the results of interviews and surveys in the field are then tabulated to be processed as needed. Data on the comparative depiction of rice farming in lebak land is described qualitatively starting from the process of land processing, planting, maintenance to harvesting. Furthermore, the comparison of the calculation of land productivity ability (Kg / ha) in lebak swampland uses the formula:

$$Y = \frac{Q}{L}$$

Information:
Y= Land Productivity (Kg/ha)
Q= Total Production (Kg)
L= Land Area (ha)

To calculate the income of each layer of rice farmers in the lebak swampland using the following formula:

$$Pn = Y \times Hy$$
$$Bp = Bt + Bv$$
$$Pd = Pn - Bp$$

Information:

Pd	= Rice farming income (Rp/ha/mt)		
Pn	= Rice farming revenue (Rp/ha/mt)	Bp	= Production cost (Rp/ha)
Bt	= Fixed Cost (Rp/ha)	Bv	= Variable costs (Rp/ha)
Y	= Rice production (Kg/ha)	Hy	= Selling price of grain (Rp/kg)

Statistically, the difference in income between the two layers is evidenced by using a *paired T-test* with the SPSS Statistical 25 program. With a α level (error rate) of 5 percent or with a confidence level of 95 percent.

Then, the strategy that must be carried out so that farmers are interested and can adapt in cultivating lebak land by applying relevant technology based on the calculation of productivity and income to be obtained, formulated using a SWOT analysis, by first identifying internal and external factors, which are grouped in strength factors (strengths, opportunities, weaknesses, and threats in farming. According to (Nourlette and

Heart, (2017),Humaidi, et al, (2021) the formulation of internal and external factors is compiled using the IFAS (Internal Factors Analysis Summary) matrix and the EFAS (External Factors Analysis Summary) matrix

The steps in the preparation of the IFAS (Internal Factors Analysis Summary) matrix table and the EFAS (External Factors Analysis Summary) table in SWOT:

1. Mengidentification and compiling variables of internal factors (strengths and weaknesses) as well as external factors (opportunities and threats) in developing rice farming in the lebak swampland.
2. Measure the weight of each of the environmental factor variables ranging from 1.0 (very important) to 0.0 (not important). All these weights do not exceed the total score of 1.0. The factors that have the most influence are given the highest weight.
3. The weight determination is used to provide an assessment of the weight of each internal and external determinant using the "*Paired Comparison"* method. The determination of the weight of each factor is used on a scale of 1,2 and 3. The weight of each factor is determined by the division of the sum of the values of each factor against the sum of the overall values of the factors using the formula:

$$A_i = \frac{X_i}{\sum_{i=1}^{n} X_i}$$

Information:

A_i = weight of the i-th factor

X_i = i-th factor value

i = 1,2,…,n

4. Give a rating for each variable with a scale ranging from 4 (very strong) to 1 (weak) based on the influence given by farmers in developing rice farming in the lebak swampland. Ratings are positive for strengths and opportunities, meaning that the greater the strengths and opportunities that exist, the greater the rating. As for weaknesses and threats, it means that the higher the weaknesses and threats that exist, the smaller the *rating*.
5. Looks up the weighting score value. The score is the result of the multiplication of the number of weights of each factor, both external and internal, to the *rating* obtained. This is done to find out the score of each factor. Then match the score values of the existing external and internal factors with the SWOT analysis quadrant with the aim of knowing the current position of the business lies in what quadrant and deciding the focus of the strategy that should be used later. The X-axis describes the internal factors and the Y-axis uses external factors.

As for the values on the X-axis and the Y-axis, they can be calculated by the following formula:

X = Total Strengths – Total Weaknesses

Y = Total Opportunity – Total Threat

Then the last stage is the determination of alternative strategies using a SWOT matrix. The SWOT matrix is used to determine a good strategy for the prospect of developing a rice business that is arranged into 4 strategies, namely SO, WO, ST, and WT

RESULT AND DISCUSSION

Overview of Lebak Rice Paddy Farming in Ogan Ilir Regency

Rantau Panjang Subdistrict, Ogan Ilir Regency in South Sumatra Province is an area where 80% of its agricultural land is a lebak swampland area. The community uses land with various farming activities with the main commodity, namely rice. Lebak swampland has a distinctive character, namely the presence of puddles in a certain period. The rice planting index in this region is divided into 2, namely IP 100 and IP 200 depending on the state of water in the field. IP 100 is carried out in April-July or commonly called farmers with one time per growing season. While IP 200 in addition to April-June, farmers also carry out the production

process in October-January. According to (Cahyana, 2017), the difference between rice cultivation in swamps and in dry land, irrigation, and tides is in the cultivation system. In the swamp lebak rice cultivation is distinguished by the seasons. In the dry season (DS) rice cultivation is called padi rintak, while in the rainy season (RS), Known as padi surung. In both seasons there are extreme conditions that can lead to crop failure. Padi rintak is prone to drought stress especially if it is late in planting, while padi surung prone to inundation.

As for the cultivation, the rice in this lebak field today is relatively the same as the stages of rice cultivation in general, which start from hatchery, land processing, planting, fertilization, weeding, pest control, and harvesting. The dominant difference is seen in the technical activities carried out, especially in the process of land processing and harvesting. The description of rice cultivation carried out by these two layers of farmers at each stage of their cultivation, is described as follows:

Hatchery Stages. The seeds used by farmers from these two layers of farmers mostly use high-yielding seeds of the Inpari 42 and Ciherang varieties. The seeds are purchased at a price of Rp5,000 per Kg, with the average use from these two layers is the same, which is 60-70 Kg per hectare. Seeding activities start with soaking the seeds for 2 nights and 1 day to stimulate growth or accelerate the process of germination. Next, the seeds are sown in the ground for 3-10 days.

Stages of Land Processing. Land preparation begins with spraying herbicides to clean up weeds or remnants of previous rice plants that are still present in the field. After spraying, the soil is fattened so that there is an air cavity to drain water and make it easier for nutrients and minerals to be absorbed into the soil. At this stage of land processing, there are differences in treatment between two layers of farmers. Soil bulking is carried out by manual farmers using hoes while farmers who use agricultural production equipment use tractors to plow the land. The cost incurred by farmers to plow the fields using tractors is IDR 1,080,000 per use. The tractors used by farmers are not owned by themselves but rather rented. This rental system is with the help of the head of the farmer group who is the link between the tenant and the one who owns the tractor. Farmers do not have tractors because the cost of buying tractors is so high that it can burden farmers. The rental of this tractor is carried out in turns due to the limited number of tractors owned. Therefore, to use a tractor, farmers have to wait in line and wait until it is their turn time so it takes time to cultivate the land. Manual farmers issue labor wages in this land processing process, which is IDR 50,000 per HOK. The use of this tractor is also in line with what is stated (Pujiharti, 2017), that in the processing of land in the current lebak land, technology is needed that can help the implementation of land processing become easier, including the use of tractors, because the use of technology that is in accordance with the specific needs of the site such as this tractor also tends to determine the productivity to be obtained.

Stages of Planting. At the planting stage, there is no difference in treatment between these two layers of farmers. The rice planting system by farmers uses the *Tabela* method (stocking seeds directly) in the paddy fields. At the seeding stage, the seeds are evenly stocked on paddy fields that are ready for planting. This method of spreading seeds does not take into account the planting distance so that the distance between rice grows from one will be very close.

Stages of Treatment. The stages of treatment are divided into fertilizing, embroidery, and spraying activities. Fertilizing is carried out one to two times. Flat farmers use urea fertilizer as the main fertilizer. Farmers buy fertilizer from shops on the market. In one hectare it takes as much labor as 1-2 people and can be completed in 1 day.

Embroidery is the maintenance of rice plants in the form of replacing plants that are not good or are attacked by pests and filling empty rice fields with new seedlings. This embroidery is important because plants that do not grow well or die will reduce the plant population which will affect rice production on the land. Spraying is carried out at the stage of maintaining rice plants from weed attacks, pests, and diseases. Pest, disease, and weed control are necessary so that rice plants are always in good condition. The types of pests on

rice plants in this region are rats and slugs. Rat pest control carried out by farmers is by using rodenticides, while slug pests use molluscicides.

Stages of Harvesting. Harvesting is the last thing to do in farming. Rice plants can be harvested after about 3 months of age or more. At the harvest stage, there are differences in treatment between these two layers of farmers. Farmers who use agricultural production equipment use a combine harvester in carrying out rice harvesting activities. The use of this harvesting tool is greatly helped, especially in the use of labor and costs in the harvesting process. In addition, the use of this machine helps in saving time and costs. Research results of (Darsani and Alwi, 2022) show that the introduction of technology in wetlands, one of which uses combine harvesters, is favored by as much as 80% of rice farmers in wetlands because it really helps to streamline the cost and time for harvesting.

The farmers at the study site also stated that the use of combine harvesters helps to streamline working time and production costs, while, first, the use of labor is less than that of farmers who are manual or who do not use combine harvester machines. Secondly, the time used by farmers using the Combine Harvesterd machine for one hectare of land only takes 1-2 hours. Third, by using the Combine Harvester machine, there are also not many grains of rice that are wasted during the rice harvesting process. Farmers who want to use the Combine Harvester machine during harvest must pay a rental fee in the form of payment in the form of a grain of 8:1 which means that each farmer gets 8 sacks of grain, then 1 sack is given to the owner of the Combine machine. Similar to tractors, farmers have to wait their turn if they want to rent a Combine Harvester because of the limited machinery they have. The price of harvested grain is IDR 4,000 per kg.

Table 1. Comparison Table of Manually Processed Farming and Agricultural Production Equipment

No	Stages	Implementation of Activities	
		Manual	**Using Agricultural Production Equipment**
1	Seeding	Inpari 16, Inpari 30, Inpari 32, Inpari 33, Inpari 44, Ciherang	Inpari 16, Inpari 30, Inpari 32, Inpari 33, Inpari 44, Ciherang
2	Land Processing	hoe, Sickle, and machete	Tractor
3	Pest and Weed Spraying	- *Handspryer* - Pests: Regent, Decis, Postat, Siputox, Buldok, Furadan, Score - Weeds: Bitop, Sitop, Lindomin, Basmilang, DMA, Format	- *Handspryer* - Pests: Regent, Sidametrin - Weeds: Sitop, Lindomin, DMA, Format, Rumpas
4	Fertilization	Urea	Urea
5	Harvesting	Hand	*Combine Harvester*

Comparative Income of Lebak Rice Farming Using Manual and Agricultural Production Equipment

Production Costs. Farmers in Rantau Panjang District, Ogan Ilir Regency, use more Agricultural Production Equipment, namely tractors to cultivate land and *combine harvesters* for harvesting. The Agricultural Production Equipment used is during land processing using a tractor and harvesting using a *combine harvester*. A comparison of the use of production costs can be seen in Table 2.

Table 2. Comparison of The Average Production Costs of Rice Farming from Both Layers of Farmers per Growing Season

No.	Information	Manual	Using Agricultural Production Equipment	Difference
1.	Fixed Costs (Rp)	94.635	3.264.400	-3.169.765
2.	Variable Costs (Rp)	7.353.330	3.561.428	3.791.901
3.	Biaya Produksi (Kg)	7.447.965	6.825.828	662.136

Based on Table 2 it is known that the average cost of production manually is higher compared to using Agricultural Production Equipment. The average cost of production with manual power is IDR 7,447,965, -edkan, the average production cost using Agricultural Production Equipment is IDR. 6,825,828,- The difference in production costs between the two alternatives is Rp.662,136,-.

To see the difference in the production costs of manual rice farming and Agricultural Production Equipment, an Independent t-test of unpaired samples (*Independent t-test*) was carried out with the SPSS Statistical 25 program. With a α level of 5 percent or with a trust level of 95 percent. So the results of the unpaired t test were obtained, namely the value of *Sig. (2 -tailed*) 0.028, because the value *of (2 -tailed*) 0.028 < 0.05. So, the decision rule is Tolak Ho, which means that the production cost of rice farming that is processed manually is higher than using Agricultural Production Equipment.

Fixed Costs. Fixed costs in farming are costs that are not exhausted in one production, including equipment depreciation costs and rental costs. The fixed costs that farmers incur from these two layers for one production can be seen in Table 3.

Table 3. Comparison of The Average Fixed Cost of Rice Farming on Two Layers of Farmers per Growing Season

No	Fixed Costs	Manual	Using Agricultural Production Equipment	Difference
1	Hoe Depreciation cost (Rp)	18.450	13.500	4.950
2	Sickle Depreciation cost (Rp)	5.625	5.625	0
3	Machete Depreciation cost (Rp)	7.560	5.400	2.160
4	*Handspryer* Depreciation cost (Rp)	63.000	63.000	0
5	Tractor Rental Cost (Rp)	-	1.080.000	1.080.000
6	*Combine Harvester* Rental Cost (Rp)	-	2.096.875	2.096.875
	Total Fixed Costs	94.635	3.264.400	3.169.765

Table 3 informs that the average fixed cost of manual rice farming is Rp94,635 per hectare per growing season, while rice farming businesses that use Agricultural Production Equipment there is an additional fixed cost component, namely the cost of renting tractors and *combine harvesters* with a total average fixed cost of Rp3,264,400,-. The difference in fixed costs that must be incurred between the two layers of farmers is Rp.3,169,765,-, which shows that the layer of farmers who use Agricultural Production Equipment incurs greater costs than farmers who work manually.

Variable Costs. Variable costs in this study are costs incurred by farmers in one planting season of rice farming manually and using Agricultural Production Equipment. A comparison of the average variable costs of manual rice farming and Agricultural Production Equipment can be seen in Table 4.

Table 4. Comparison of Average Variable Costs of Rice Farming from Two Layers of Farmers per Growing Season

No	Variable Costs	Manual	Using Agricultural Production Equipment	Difference
1	Seed (Rp/Kg/Ha/Growing Season)	476.333	472.875	3.458
2	Fertilizer Urea (Rp/Kg/Ha/Growing Season)	46.467	222.325	175.858
3	Rodenticides (Rp/Kg/Ha/Growing Season)	178.333	224.875	46.542
4	Molluscicides (Rp/Kg/Ha/Growing Season)	112.467	165.750	53.283
5	Herbicides (Rp/Kg/Ha/Growing Season)	567.000	727.175	160.175
6	Labor Wages			
	- Seeding (Rp/workers' day)	246.875	433.828	-86.953
	- Land Processing (Rp/ workers' day)	1.727.000	0	1.727.000
	- Planting (Rp/ workers' day)	1.311.417	1.099.000	212.417
	- Embroidery (Rp/ workers' day)	19.000	28.500	9.500

- Pest Spraying (Rp/ workers' day)	25.563	43.500	17.937
- Weed Spraying (Rp/workers' day)	53.542	26.875	26.667
- Weeding (Rp/ workers' day)	290.209	310.250	20.041
- Harvesting (Rp/workers' day)	2.110.833	0	2.110.833
- Shedding (Rp/workers' day)	104.167	0	104.167
- Transport (Rp/ workers' day)	78.125	0	78.125
- Drying (Rp/ workers' day)	6.000	0	6.000
Total Variable Costs	7.353.330	3.561.428	3.791.901

Table 4 informs the average variable cost of manual rice farming of Rp7,353,330 per hectare per growing season, while farmers who use Agricultural Production Equipment amount to Rp3,561,428 per hectare per growing season. The difference in the average production cost between the twois IDR 3,791,901. In the layers of farmers who use Agricultural Production Equipment, it does not reduce the cost of labor wages in the process of land processing and harvesting because it uses Agricultural Production Equipment in the form of tractor rental and *combine harvesters*. The cost of renting Agricultural Production Equipment is included with labor so that Agricultural Production Equipment farmers do not need to spend labor wages for land processing and harvesting.

Revenue. The revenue of lebak rice farming in this study was obtained from the results of grain production produced per one planting season at a unit selling price per kilogram. A comparison of the results of the products produced by these two layers of farmers is presented in table 5.

Table 5. Comparison of Average Production, Selling Price, and Acceptance of Rice Farmers from Two Layers per growing season

No	Component	Manual	Using Agricultural Production Equipment	Difference
1	Production (Kg)	3.617	4.134	517
2	Price (Rp/Kg)	4.000	4.000	0
3	Revenue (Rp)	14.466.667	16.535.000	2.064.000

Based on Table 5, it can be seen that the average production produced by farmers who use Agricultural Production Equipment is higher than farmers who do farming manually with a production difference of 517 Kg per Ha per growing season. Production in the form of grain is sold at a price of Rp. 4,000 per kilogram, so the revenue obtained by manual farmers is Rp. 14,466,667 / Ha / MT, while the revenue obtained by farmers using Agricultural Production Equipment Rp 16,535,000,-.

Rice Farming Income. The income of farmers obtained from the receipts received by farmers is reduced by the total cost of production incurred by farmers during the production process, as can be seen in Table 6.

Table 6. Comparison of The Average Income of Farmers From Two Layers

No	Component	Manual	Using Agricultural Production Equipment	Difference
1	Revenue (Rp)	14.466.667	16.535.000	2.068.333
2	Total Cost of Production (Rp)	7.447.965	6.825.828	622.136
3	Income (Rp)	7.018.702	9.709.172	2.690.470

Based on Table 6, the average income of farmers using manuals per one growing season is IDR7,018,702 while using Agricultural Production Equipment per one planting season is IDR9,709,172. This proves that the average income of Agricultural Production Equipment farmers is higher than that of manual laborers. However, this income has not been categorized to the maximum, the results of the study (Guwat,

Waluyo and Priatna, 2018) stated that if the cultivation of rice in the lebak land using technology and supported by the right type of seed, it will provide an average income of Rp.14,300,000 per hectare per growing season. In addition to the proper use of seeds, an increase in income through an increase in production can also be carried out, as stated by(Asnawi, 2017), which states that increasing production in rice entrepreneurs, can be done in addition to the use of appropriate seeds, must also be supported by the use of other means of production such as fertilizers that suit the needs of land and crops.

Statistically, the difference in income between the two layers was tested using *a paired T-test* with the SPSS Statistical 25 program. With an α level (error rate) of 5 percent, the results of the paired t-test were obtained, namely the Sig. *(2-tailed*) value of 0.030, because of *the Sig. (2-tailed*) value was 0.030 < 0.05. So rejecting Ho and receiving Ha means that there is a difference in the income of farmers who work manually and use Agricultural Production Equipment in the process of land processing and harvesting. The income of farmers using Agricultural Production Equipment is higher than using manual labor.

Farmer Adaptation Strategy to Cultivate Lebak Land by Applying Relevant Technology to Achieve IP 200 on Lebak Land

The formulation of a farmer adaptation strategy to be able to expose Agricultural Production Equipment technology is preceded by identifying what factors are the strengths, weaknesses, opportunities and threats in carrying out rice farming, which can be formulated into a strategy, with the following identification results:

***Strength*.** Strength is one of the important factors that can be considered in determining the adaptation strategy of farmers to be able to adopt Agricultural Production Equipment in their farming efforts in order to change the planting intensity from IP 100 to IP 200. The identified strengths possessed in carrying out this lebak rice farming business are:

1. The lebak land available for rice farming is still quite large, so it can help carry out an extensibility program in collaboration with the rice farming intensification program
2. Farmers have skills in trying to farm rice paddy fields and generally also pass on their knowledge and farming skills to their children so that this ability continues to be maintained by the people here for generations.
3. There is an experienced workforce from within the family and outside the family.
4. Production inputs are available and easy to obtain, thus supporting the ease of implementation of the farming business

***Weakness*.** Weakness is one of the components of the internal factors of a business. Weaknesses can also be referred to as limitations possessed by farmers in carrying out adaptation strategies that really need to be considered to be minimized. The identified weaknesses of rice farming carried out by farmers in this region are:

1. The education, knowledge, and skills of farmers are still relatively low, which tends to make farmers lack innovation in carrying out their farming business, relying only on traditional knowledge that has been applied since the decline and has not adapted to more modern technology.
2. Limited capital in farming, which is the cause of farming business has not implemented good agriculture practices (GAP) rice which tends to have an impact on the non-optimal production produced.
3. Limited access to market information, which tends to cause farmers to rely solely on local markets and collectors to sell their farm products in a position only as a price taker.
4. Production results still vary in terms of quantity and quality, which is the cause of the selling price of GKP still fluctuating.

Opportunity. Opportunity is defined as an important situation that is profitable in the environment of a business (in this case it is a farming business), which becomes an external factor that can be empowered in the formulation of this adaptation strategy. The identified opportunities of this farming business are:

1. The availability of subsidized fertilizers for farmer groups, which can help the limitations of farmers in purchasing production inputs
2. The availability of lebak land development assistance programs from the local government that can help farmers develop their rice farming businesses.
3. The availability of Agricultural Production Equipment procurement assistance programs that can be accessed by farmers through local governments
4. The results of the study showed that the production and income of farmers who used Agricultural Production Equipment were higher than manual processing.
5. The market demand for grain and rice is quite high and consistent, which is not only from the local market but also from markets outside the region.
6. Collecting merchants are available in each sub-district, which can accommodate the purchase of farmers' produce

Threat. Threats are one of the external factors that need to be considered and can be interpreted as an unfavorable situation for farming because it can be an obstacle in the adaptation strategy carried out by farmers. Some of the threat factors identified are:

1. Climate anomalies, are a threat because the majority of rice farming in this region is carried out with a rainfed system, which still has to depend on nature.
2. Attacks of pests and diseases, leading to the occurrence of crop failure
3. Declining interest of young people to become farmers, which can threaten the sustainability of farming
4. Input prices fluctuate

After identifying the factors of strengths, weaknesses, opportunities, and threats owned by farmers in carrying out their farming business, the next step is to analyze the factors that have been determined in the IFE and EFE matrices. According to David (2004), the function of the IFE matrix is to summarize and evaluate strengths and weaknesses in various fields. The results of the IFE matrix created can be seen in Table 7 and 8.

Table 7. Internal Factor Analysis of Lebak Rice Commodities

Internal Factors	Weight (0-1)	Rate (1-4)	Score = (Bx R)	Total
Strength (S)				
a. Availability of land for extensification is still available	0,20	2	0,40	0,40
b. All production inputs are available and easy to obtain	0,30	4	1,20	1,20
c. The average farmer is experienced in rice farming	0,25	3	0,75	0,75
d. In-family and out-of-family labor available	0,25	3	0,75	0,75
Total Score	**1,00**			**3,10**
Weakness (W)				
a. Education, knowledge and skills of farmers are still low	0,25	2	0,5	0,5
b. Limitations of capital at the farmer level	0,25	2	0,5	0,5
c. Limited access to market information	0,30	2	0,6	0,6
d. Production and productivity results still vary	0,20	2	0,4	0,4
Total Score	**1,00**			**2,0**
Internal Score (Strength-Weakness) : S-W				**1,1**

Table 8. Analysis of Strategic External Factors of Lebak Rice Commodities

External Factors	Weight (0-1)	Rate (1-4)	Score = (Bx R)	Total
Opportunity(O)				
a. Availability of fertilizer subsidies	0,20	3	0,6	0,60
b. Availability of lebak land development assistance program from the local government	0,20	3	0,6	0,60
c. Availability of Agricultural Production Equipment assistance program	0,20	4	0,8	0,80
d. Availability of Collecting merchants in each sub-district	0,10	3	0,3	0,30
e. The results showed that the production and income of farmers who used Agricultural Production Equipment were higher	0,20	3	0,6	0,60
f. Market demand for grain and rice is quite high and consistent	0,10	2	0,2	0,20
Total	**1,00**			**3,10**
Threats (T)				
a. Climate anomalies	0,30	2	0,6	0,60
b. Attacks of pests and diseases	0,30	3	0,9	0,90
c. Declining interest of young people working as farmers	0,20	2	0,4	0,40
d. Input prices fluctuate	0,20	2	0,4	0,40
Total	**1,00**			**2,30**
External Score (Opportunity-Threat) : O - T				**0,80**
S-W	**1,10**			
O-T	**0,80**			

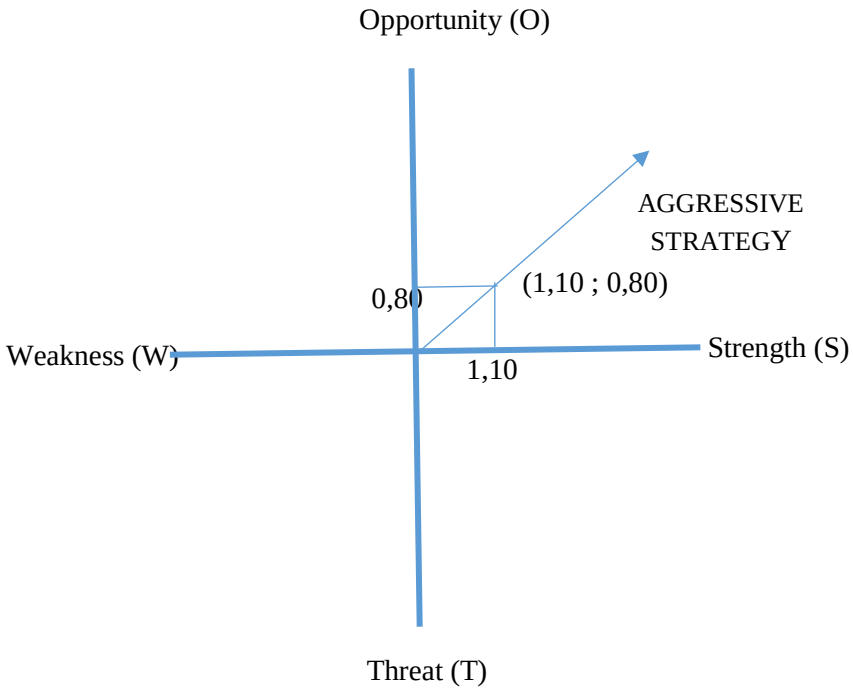

Figure 1. SWOT Analysis Diagram of Strategies to Develop Lebak Rice Farming Business through the Use of Agricultural Production Equipment in Ogan Ilir Regency

Based on Figure 1, it can be explained that the position of the Lebak Rice commodity business in Ogan Ilir Regency is in quadrant I, which is in a very favorable position and situation. Lebak Rice commodities have opportunities and strengths whose value is greater than the weaknesses and threats that exist, so they can take

advantage of the opportunities that exist. The strategy that must be set out in this quadrant is to support aggressive growth policies because the position in quadrant I show that the condition of the lebak rice paddy commodity business has a very favorable situation because there are opportunities and advantages so that they can use the opportunities they have. The result of decision-making from the SWOT matrix is presented in Table 9.

Table 9. SWOT Matrix

Internal Factors **External Factors**	**STRENGTHS (S)** 1. The availability of land for extensification is still wide 2. All production inputs are available and easy to obtain 3. The average farmer is experienced in rice farming 4. In-family and out-of-family labor available	**WEAKNESS (W)** 1. Education, knowledge and skills of farmers are still low 2. Limitations of capital at the farmer level 3. Limited access to market information 4. Production and productivity results still vary
OPPORTUNITIES (O) 1. Availability of fertilizer subsidies 2. Availability of development assistance program 3. Availability of Agricultural Production Equipment assistance 4. Collecting merchants in each sub-district are available 5. The production and income of farmers who used Agricultural Production Equipment were higher 6. Market demand for grain and rice is quite high and consistent	**SO Strategy** 1. Implementation of land extensification program through the clearing of new lebak paddy fields with the use of Agricultural Production Equipment in accordance with the land 2. Optimization of Agricultural Production Equipment assistance as needed through the empowerment of farmer groups 3. Establishment of UPJA to support lebak rice farming activities 4. Socialization and education of research results on rice optimization in lebak land to provide motivation and confidence for farmers in carrying out lebak farming with IP 200	**WO Strategy** 1. Increased extension, mentoring, and training activities at the farmer level to improve their behavior in farming 2. Facilitation of capital institutions that can help farmers in the development of their farming business 3. Facilitation of marketing through farmers' market programs and institutional strengthening in order to help strengthen the bargaining position of farmers 4. Education on the application of GAP in rice farming
THREATS (T) 1. Climate anomalies 2. Attacks of pests and diseases 3. Declining interest of young people working as farmers 4. Input prices fluctuate	**ST Strategy** 1. Facilitating the use of Agricultural Production Equipment which can accelerate the planting period 2. Increasing the interest and motivation of young people in farming through the introduction of the application of technology in farming to make farming more efficient and profitable 3. Facilitation of cooperation with research institutions and universities to help the problem of pest and disease attacks 4. Introduction of information technology among farmers through social media that can provide information on farming and markets	**WT Strategy** 1. Empowerment and activation of farmer groups as a forum for sharing information and discussion in finding solutions to farming problems 2. Activation of institutions/associations of young people in farming activities, for example in online marketing activities, the use of technology / Agricultural Production Equipment in farming 3. Improving the skills of farmers and the younger generation through training and mentoring activities from various institutions related to wetland development. 4. Development of market information

The plan that can be used is a growth-oriented strategy, with the choice of aggressive strategy policy is to carry out a strategy to strengthen production facilities, especially the use of Agricultural Production

Equipment at the stage of land processing and harvesting, strengthening and empowering farmer institutions, market development by shortening the marketing chain, expanding the market, and branding products in the market. In its implementation, it requires the support of the government and the rice industry in the final industrial process. In terms of the business cycle, it shows that this commodity is in a stable condition and has a high prospect of sustainability.

CONCLUSION

The results of this study provide a conclusion that in the cultivation of lebak rice carried out by farmers who work manually and use Agricultural Production Equipment in general there is no difference, but in the technical implementation, there are differences in land processing and harvesting activities on the use of agricultural production equipment which has an impact on differences in the use of the amount and time of labor, the efficiency of working time and the reduction of production loss. Farmers who apply mechanization technology in cultivating rice in lebak land can do their farming with IP 200, incur lower production costs, as well as higher production and income when compared to farmers who work on it manually

The results of the matrix strategy analysis show that the adaptation strategy that must be carried out by farmers is the SO strategy because it has been in quadrant I, which shows that rice farming in lebak land is in a strong position and has a great opportunity to be carried out, which uses a *growth-oriented strategy*, with an aggressive strategy that can be chosen is to carry out a strategy to strengthen production facilities, especially the use of Agricultural Production Equipment at the land processing stage and harvesting, strengthening and empowering agricultural institutions, developing the market by shortening the marketing chain, expanding the market, and branding products in the market

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