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**CHANGES FROM THE INDIVIDUAL FARMING MODEL TO THE GROUP FARMING MODEL: TYPES,  
IMPACTS, AND EXAMPLE OF CHANGES**

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**ABSTRACT**

The problem of farmers in Indonesia, where the average business is small scale with an average land area of 0,2 hectares, making it difficult to optimize income. This research aims to find out what happens if farming is merged into a business group to increase the business scale. This research uses a combination of researchers' concepts with the result of previous research. The expected result is a reference for a new business model that can be implemented by farmers. The objects studied include the types of changes that occur along with their impacts and a description of changes in costs due to changes in technology used. The results of this research show several impacts of the changes made. At first glance, some changes seem detrimental to several parties especially farmers. In fact, these changes only substitute factors that usually occur into other factors that provide higher profits. Such as changes in land processing technology, transplanter machines and combine harvesters which require large capital at the start. In fact, these three types of technology provide many benefits such as accuracy and speed of work, cost efficiency and increased quality of result.

**Keywords: Group farming, change, efficiency, scale increase**

**Introduction**

Agriculture in Indonesia is highly labor intensive, making little use of capital investments, reflecting the relative factor endowments of the country. Growth that is labor intensive will continue to create employment for a large share of the workforce but it is unlikely to result in significant increases in per capita income for agriculture workers (World Bank (2010). The increase in agricultural results in traditional methods through expanding land and human labor, which has long been doubted (Barnes *et.al*, 2019). Various efforts, were undertaken, such as made a diversify agriculture, create intensification by fertilizer or intercropping (Madembo *et.al*, 2020), technological innovation, and the development of agricultural mechanization (Herdis *et.al*, 2023). However, all these steps have not significantly improved the welfare of farming actors.

One of the small capital investments is shown by the area of land owned, which is on average less than 1 hectare. The small scale of existing farming businesses allows several risks to occur which can affect income. As LaMarco (2019) stated, there are 4 disadvantages of small-scale businesses. The disadvantages include: 1) small businesses have less brand recognition; 2) small businesses experience higher costs; 3) have smaller budgets; and 4) cannot compete on price. Besides that, Ilaz *et.al* (2016) stated that small-scale businessse have a difficulty in obtaining necessary capital for continuation of business.

Investment in agriculture needs to focus on increasing agricultural growth through greater productivity by deepening capital investment and moving towards higher value-added commodities, rather than through an input-driven approach. Economic of scale show how output changes when there is an increase in input (Carvalho and Marques, 2014). One way to increase the scale of farming can be done by merging businesses, namely combining land and capital to minimize costs. As Guerrini *et.al* (2018) explained that Increasing economies of scale occur when increased production resulting in more output (for example through mergers and acquisitions) leads to lower production costs. In practice, this will cause many changes to the farming system such as the business management system, technology and the status of the farmers themselves. This research aims to describe the steps to start a business merger and changes in factors that occur such as system, technology and costs.

## **RESEARCH METHOD**

This research uses a combination of researchers' concepts with the result of previous research. The assumption in this research is that a rice farmer with the average land area of small farmers is 0,2 hectares. Then the cultivation of the narrow land will be compared with a larger land unit of 2 hectares or more. The objects studied include the types of changes that occur along with their impacts and a description of changes in costs due to changes in technology used. The expected result is a reference for a new business model that can be implemented by farmers

## **RESULT AND DISCUSSION**

### **Merging Land**

The first step that must be taken in merging businesses is merging land. In Abdul and Faisal's (2022) research, it was stated that the classification of farming scale based on land area is as follows: 1) small scale with an area of farming land less than 0,5 hectares; 2) medium scale with a farming land area of 0,5 – 0,99 hectares; and 3) large scale with land area farming business of 1 hectare or more. If small farmers are assumed to have an average of 0,2 hectares of land, then 5 or more farmers are needed to achieve a large scale.

Farmers' land is merging into one expanse without physical boundaries. Removing physical barriers and using land together must be accompanied by legal certainty that protects each party, as proven by a certificate of ownership of the land. According to Bambang *et.al* (2019), as positioning technology develops, measurement and mapping of land plots can be carried out by utilizing satellite technology. Activity land plot measurements are tied to base points techniques that can be measured and mapped with using Global Positioning System (GPS). GPS mapping using the DGPS method has broad measurement results plot of land that meets the tolerance requirements for area plot of land that has been determined by BPN as agency that regulates survey provisions cadastral in this case the measurement of land parcels for land registration requirements. With this, there is no worry for each farmer regarding their land ownership even though the physical boundaries are removed.

### **Changing Business System**

Small-scale farming is farming that is usually managed by the farmer himself as the owner of the land, or rents a small area of land, then utilizes all available resources to manage the farming business. The labor used is generally family labor, and the technology used is simple technology. In this merger business, there are combination of capital and combination of the resources used. The capital in question is for purchasing machines such as tractors, transplinters and combine harvesters to make work easier.

The division of capital and profits is based on the percentage of total land ownership merged. However, if the total merging of land area by each farmer is the same, then the amount of capital and profit is divided equally. For this type of large-scale business management, it will certainly change the timing of profit distribution. Because apart from part of the profits being added as business development capital, there are also management or maintenance costs such as machine maintenance. Whether this change is efficient or not can be seen from several factors in farming management as below.

**a. Land Processing Cost**

Nowadays, tractors are widely used as land processing machines in both small-scale and large-scale farming. According to Algirdas et.al (2019), tractors have to perform a variety of agricultural tasks in fields of different sizes. While working, tractors consume large amounts of fuel. The fuel consumption for fields operations depends on many factors, including one quite significant factor: the area of land planted (Lacour et.al, 2014). The type of tractor commonly used to cultivate narrow land is two wheels tractor. Based on research conducted by Indya et.al (2021), the capacity for using a hand tractor is as in the table below.

**Table 1. Capacity of Two Wheels Tractor**

No	Description	Achievements
1	Capacity	0,2995 ha/hour
2	Fuel Usage	2,16 liters/hour
	Speed	1 m/s
3	Rental Costs (IDR)	200.000/day

Source: Indya et.al (2021)

Table 1 shows how the tractor performs when used by 1 farmer. If each farmer has 0,2 hectares of land, the cost of renting a tractor is very inefficient because of the daily rental fee system. If the accumulated land area is 1 hectare, then the table applies to the accumulation of 5 farmers. And if the accumulated land area is 2 hectares, then the table applies to the accumulation of 10 farmers. An overview of the calculations is presented in Table 2 below.

**Table 2. Performance of 2-Wheeled Tractor Use by Individual Farming**

No	Description	Achievements	Multiple Value/Hectare	Accumulated to 1 Hectare	Accumulated to 2 Hectare
1	Capacity	0,2995 ha/hour	5	3 Hours 40 Minutes	7 Hours 20 Minutes
2	Fuel Usage	2,16 liters/hour	5	7,34 liters	14,68 liters
	Speed	1 m/s			
3	Rental Costs (IDR)	200.000/day	5	1.000.000/day	2.000.000

Based on Table 2, it can be concluded that the more farmers work on the land individually, the more time it takes and the higher of tractor's rental costs incurred. This efficiency will be different when farming is carried out in

groups. Because the area of land being cultivated is 1 stretch of at least 1 hectare, the type of tractor used is a 4-wheeled tractor. The average purchase price for a 4-wheeled tractor is around IDR 100.000.000. Table 3 below shows how 4-wheel tractors are used in group farming.

**Table 3. Performance of 4-Wheeled Tractor Use by Group Farming**

No	Description	Achievements	1 Hectare Conversion	2 Hectare Conversion
1	Capacity	0,351 ha/hour	2 Hours 17 Minutes	4 Hours 34 Minutes
2	Fuel Usage	2,97 liters/hour	6,45 liters	12,9 liters
	Speed	1,25 m/s	-	
3	Cost of Depreciation (IDR)	2.222.222/plant season	2.222.222	1.111.111

From Table 3 we can see that the time used is very fast, approximately half a person's working day. Although the group farming system has depreciation costs for the equipment it owns, if it is used on larger areas of land, these depreciation costs will be even smaller. The difference in comparison of the two farming systems in land processing can be seen in Table 4.

**Table 4. The Difference of the Two Farming Systems in Land Processing**

Performance Factors	1 Hectare			2 Hectares		
	Individual	Group	Differences	Individual	Group	Differences
Capacity	3 Hours 40 Minutes	2 Hours 17 Minutes	1 Hour 23 Minutes **	7 Hours 20 Minutes	4 Hours 34 Minutes	2 Hours 46 Minutes**
Fuel Usage	7,34 liters	6,45 liters	0,89 liters**	14,68 liters	12,9 liters	1,78 liters**
Rental Cost (IDR)	1.000.000			2.000.000		
Cost of Depreciation (IDR)		2.222.222	1.222.222*		1.111.111	888.889**

Information: Individual System is Better (\*)

Group System is Better (\*\*)

From the Table 4, it can be seen that individual farming is only better if the cultivated land is only 1 hectare. The consideration is that the use of time and fuel are not significant enough, even the cost of equipment depreciation is actually higher than renting a tractor. However, if you compare all factors on 1 or 2 hectares of land, the group system has more advantages than the individual system.

The use of a 4-wheeled tractor shows several factors that are more efficient than a 2-wheeled tractor. Because this 4-wheeled tractor is assumed to be owned for business investment, it has a higher depreciation value compared to the price of renting a 2-wheeled tractor per day. However, this depreciation value will be lower if the area of land cultivated is larger. Reflecting on rice farmers in Shouteast Nigeria, in research conducted by Ben *et al* (2014), the mean farm size available to each farmer was 1,66 hectares. Therefore, only 10 farmers are needed in groups to achieve effectiveness and efficiency in land processing. Apart from that, the criteria for the land used must be in one area, not scattered.

#### b. Cost of Planting Seed

The activity of planting rice seedlings requires quite a lot of labor and takes a long time so that the costs incurred are more Suci et.al (2022). This is exacerbated by the high cost of cultivating labor as a result of the scarcity of labor in rural areas. Next, Chaki et.al (2021) explained that, planting is an important part of rice cultivation which takes up around 25% of the total cultivation workforce. Most manual workers have entered a non-productive period, and there is also reluctance and reducing the enthusiasm of the younger generation in carrying out agricultural activities which are increasingly carried out using traditional systems agriculture.

The condition above is what usually happens in small-scale farming, where planting still uses traditional methods, that is using human hands. This is different from large-scale farming, which allows the use of rice planting machines, namely rice transplanter. Meanwhile, for large areas of land it is very possible to use a transplanter machine. In contrast to narrow land, the use of this transplanter machine is considered difficult to maneuver. As an illustration, the price of a rice transplanter machine is around IDR31.200.000. The table below shows the difference in performance between conventional planting methods and transplanter machines.

**Table 5. Comparison of Conventional Planting with a Transplanter Machine**

Description	Conventional	Transplanter
Labor Used (person)	30 - 35	3
Duration (hour)	4	6 – 7 (speed 2,34 km/hour)
Labor Cost	2.000.000	125.000
Depreciation (Rp/season)	-	150.000

Source: Sudirman & Pangaribuan, 2017

Due to the lack of labor for planting rice get effect on delay planting and also difficult on make planting on the same time on several areas then later on will reducing the rice index crop yearly. Another negative impact on crop disease and insect then will reducing final yield of rice (Pitoyo and Idkham, 2021). Based on Table 5, it can be seen that conventional planting will be completed more quickly if it is done by many people. The amount of labor used by conventional methods is 10 times or even more than using a transplanter machine. This is also creates a significant gap in labor costs, and it is clear that using a transplanter machine is more cost-effective. Even though there are depreciation costs for using a transplanter machine, this is still very affordable because the purchase price of the machine is also quite affordable.

**c. Harvesting**

Farmers with limited land usually harvest rice conventionally, that is using sickles. However, harvesting rice on large areas of land can be more effective with using a combine harvester. Mochamad et.al (2021) explained that combine harvester is a modern machine used for cutting rice, threshing and cleaning while walking in the fields. This machine helps farmers where time and energy to harvest more efficiently and does not require a large amount of labor like traditional harvesting. The price of this combine harvester machine is around IDR113.800.000. Using a combine harvester for 2 hours is equivalent to 6 farm workers working for 7 hours. This will certainly save a lot of labor, because to harvest 1 hectare of rice field it only takes 1- 2 hours (Distanpangan Pemkab Magelang, 2016). Based on the result of research conducted by Al Asri (2016), using a combine harvester only requires a harvest

cost of IDR 2.600.000. This is different from the conventional method which is not only a harvesting activity, but also requires collecting and threshing rice which when added up, costs IDR 4.308.000.

Based on assessment of several factors such as time use, labor and costs, the technology that supports large-scale farming is more efficient than the factors used by small-scale farmers individually. However, to start this business combination, farmers need quite a lot of capital at the start, including capital to purchase the following tools:

**Table 6. Initial Capital for Purchasing Equipment**

No	Tool Types	Price (IDR)	Number of Capital		
			5 Farmers – 1 hectare (IDR)	10 Farmers – 2 hectares (IDR)	15 Farmers – 3 hectares (IDR)
1	4-Wheeled Tractor	100.000.000			
2	Rice Transplanter	31.200.000	49.000.000	24.500.000	16.333.333,33
3	Combine Harvester	113.800.000			
	<b>Total</b>	245.000.000			

The initial capital that farmers have to spend is still quite high even though it has to be borne by 15 people. And the capital presented in Table 6 is only investment capital for technological equipment, excluding capital for other production factors such as seeds, fertilizer, labor and medicines. However, what must be considered is that this capital is a long-term investment aimed at increasing long-term income.

#### Advantages and Disadvantages of the Group Business Model

The group business model aims for cost efficiency and optimization of production results. The ultimate goal is the level of farmer welfare. The table below shows some of the impact of changing the farming model to a group business model.

**Table 7. Changes in Farming Models and Their Impacts**

No	Changes	Effects
1	Farmers act as investors	Increasing the number of unemployment
2	Reducing the elderly workforce	
3	Use of more modern technological tools	Farmers' initial capital is very large
4	Higher yields	Price risk when harvesting large quantities
5	Business development opportunities	Reducing the share of farmers' income
	There is management cost (employee salaries)	
6	The land area is maximized because there are no physical land boundaries	Not many farmers understand digital barriers such as GPS
		Farmers do not have the freedom to sell land at any time

Source: Data Processing Auth, 2023

The effective use of technology has the effect of reducing the amount of labor used. Therefore, some farmers who are members of this business group may only act as investors or managers. If some farmers act only as investors, do not contribute anything to the business group, and only wait for the distribution of profits from the result of the business, it can be said that these farmers are no longer working, in other words they are unemployed. The impact is that it will contribute to the unemployment rate for the country. However, if you look at this from another point of view, some of these farmers actually have a lot of free time to do other work outside of rice farming. If the energy they usually use in rice farming is substituted for other productive activities, it will increase their family income and level of welfare.

The next change is use of more modern technological tools that impact to higher of initial capital. The average farmer in Indonesia is a poor farmer with limited capital ownership. But now, many financial institutions offer farming credit or people's business credit such as KUT and KUR with low interest rates. This goes back to farmers' knowledge of how to access information on banking services. Apart from accessing credit facilities, farmers can also increase the number of group members in the business to further reduce the amount of initial capital that must be spent.

In Indonesia there are often cases of falling prices of agricultural goods due to the big harvest, such as the impact of changes in point 4. Here the role of the government is really needed to protect prices at the farmer level. Other protections are needed to maintain the security of farmers' land ownership due to the loss of physical barriers, this is to address concerns regarding changes in point 6. Until now, it is still widely recorded that agricultural land in Indonesia does not have land ownership certificates.

Last, business development opportunities and management cost has impacts to reducing the share of farmer's income. Actually, the profits for farmers are not reduced at all, but are substituted for additional investment capital for each farmer. In fact, what actually reduce income is if the farming group uses special management staff to manage its business. So that, each farmer has to pay for management salaries which are paid every month, without waiting for harvest time.

## **Conclusion**

Overall, the change in the farming management system into groups has had a positive impact. Effectiveness and efficiency can be achieved from several aspects such as time, use of labor, and the amount of costs incurred. And of course the overall impact of these changes is able to increase the income and welfare of farmers.

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