Technical Efficiency of Soybeans Commodity

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Abstract

This research aims to find out the description of soybean farming in Grobogan Regency, the efficiency of technical, price, and economy on soybean systems. Grobogan Regency is a major soybean producer in Central Java and Indonesia. Based on the research result, it reveals that soybean farming in Grobogan has still not been efficient yet in technic, price, and economy. It means that farmers have not been able to optimize the inputs to obtain the maximum output. This inefficiency condition occurs because the farmers are considered to use the production factors excessively. Besides damaging the nature, the use of excessive production factors also leads to increasing production costs but without maximal results. Therefore, it requires a series of attempts to give knowledge to the farmers in order to reach efficient conditions by hoping that potential to maximized profit

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1. INTRODUCTION

In this globalization era, the development of the agricultural sector should be carried out considering that agricultural commodities do not only become the consumer goods but also the industrial commodities either as the raw material or the goods ready for consumption (Tun, 2015).

The development of the agricultural sector needs to be implemented in order to improve the economic sector in the form of the increase in production output and quality and also the ability to raise the welfare of the farmers, so that the agricultural sector is expected to be competitive and able to bring prosperity to the business actors both socially and economically therein.

According to Syahyuti et al. (2003) and Manning (2015), the agricultural sector may become one strategy for recovery while giving a foundation for the

development of the real sector of the economic crisis experienced by Indonesia since 1997. This can be proved by the high power when other sectors get collapsed.

The agricultural sector in Indonesia is one of the main sectors driving the economy. The proof is that the agricultural sector contribution to the GDP of Indonesia is the second largest after the industrial sector. In its development, the agricultural sector is still concentrated in Java, especially for food crops (rice, corn, and soybeans). So Java Island is supporting the agricultural sector in Indonesia, in which its contribution to the national agricultural map of Central Java province is one of the major agricultural regions in Java Island.

Central Java Province is a region of national food supplier. The contributions of rice production reach 16% of the national rice production (Dispertan Central Java: 2007). Central Java is one of the main production centers of commodity of crops and horticulture in Indonesia (Sucihatiningsih: 2010) and Budi Setiawan (2011). Some commodities of crops such as corn, soybeans, green beans, and peanuts are potential enough as the alternative food, nutrient source, and agro-industry development, while some horticultural commodities (onion, garlic, peppers, cabbage, potato, mango, durian, rambutan, salak, longan) are the agribusiness commodity and become the regional superior. The land area planted by rice is still more dominant than the area planted by the other crops.

Each District / City in Central Java also contributes the high production of agricultural commodities and food crops in Central Java province itself. Most of the districts / cities in Central Java are the agricultural areas in which agriculture becomes the economic base. Budi Setiawan (2015).

Grobogan Regency is the third largest land area in Central Java, which consists of 18 districts. With its potential large land area, Grobogan Regency becomes one of the barns in Central Java and even in Indonesia; the majority of Grobogan people also work in the agricultural sector. It is the largest contributor to the GDP of Grobogan yearly.

Soybean is one of the agricultural superior commodities of Grobogan Regency. Soybean commodity is widely cultivated by farmers because the topography is consistent with the characteristics of the soil in Grobogan, therefore soybeans can grow fast and profitable when being cultivated. In 2003 the soybean production of Grobogan is the most widely in Central Java, even the soybean superior seeds developed in Grobogan have been a patent with *Grobogan Variety* soybean.

However, so far Indonesia still relies on imported soybeans, especially when it is lack of shortages. It is partly also because the production of soybeans in soybean-producing areas is very fluctuating while soybean demand in the market tends to increase. Soybean planting activities are generally carried out in the dry season; this is because soybeans' character is palawija crops and dry-typed plant. Farmers commonly plant soybeans once or twice a year depending on rainfall

condition during the growing season. Fertilizers used for the soybean farming are the same type as for rice and corn farming; those are urea, TSP and Phonska. But the difference is in the proportion of giving each fertilizer.

As for the use of medicine for the prevention of diseases and pests of course is different from the other two commodities because the types of diseases and pests that attack areal so different. Soybean farmers commonly use medicine with brand of *skor* and *atabron*. They frequently and widely use both types of medicine in supporting the farming activities especially to prevent the spread of pests and diseases.

Table 1. The Largest Center of Soybeans at 12 Regencies in Central Java Years of 2008– 2012 (in thousands of ton)

NO	Regency	Year				
		2008	2009	2010	2011	2012
1	Wonogiri	35.806	38.019	37.739	33.496	29.805
2	**Grobogan**	**11.638**	**62.604**	**15.313**	**32.970**	**61.327**
3	Demak	8.742	8.929	7.758	6.454	10.855
4	Brebes	7.211	6.318	7.969	7.584	9.406
5	Sukoharjo	6.610	5.934	6.531	6.343	6.405
6	Rembang	5.775	3.498	6.687	2.322	3.883
7	Klaten	5.521	5.475	7.245	6.112	6.109
8	Cilacap	4.933	4.591	3.677	2.815	4.252
9	Blora	4.852	4.669	6.725	4.717	7.942
10	Kebumen	4.287	5.948	8.540	4.214	6.075
11	Banyumas	3.880	3.243	4.649	2.772	3.272
12	Boyolali	3.559	5.575	5.675	3.956	3.142
13	Lainnya	11.037	12.305	13.752	9.454	14.608
	Total	113.852	167.107	132.261	123.209	167.081

Source: Bakorluh Dispertan Central Java (2012)

The high contribution of Grobogan Regency to the total production of agricultural commodities in Central Java, particularly food crops of rice, corn, and soybeans, has made Grobogan become one of the agricultural centers in Central Java Province, especially with its position as the third largest area in Central Java; of course it will impact on the magnitude of the potential farm land under cultivation. However, Grobogan value of GDP is lower than other regencies and cities.

Improving the welfare of farmers and increasing the agricultural output are the goal of the Government and all elements having interest in agricultural map of Grobogan Regency; therefore, it requires a series of strategies and comprehensive policies to develop the three commodities. Therefore, this research uses the efficiency approach of the use of production factors in analyzing the performance of

the agricultural sector, the use of production factors in the farming measured from the efficiency levels in technique, price, and economy

Table 2. Target and Realization of Productions of Rice, Corn, and Soybean In Grobogan Regency 2012

No.	Commodity	Production Target (ton/Ha)	Production Realization (ton/ Ha)
1.	Rice	10	6,33
2.	Corn	5,5	5,3
3.	Soybean	3	2,5

Source: Dipertan TPH Grobogan Regency (2012)

Soybean is the superior agricultural commodity in Grobogan; people need a lot of demand to these three commodities. Soybean farming productivity in Grobogan apparently is below the target of the Government of Grobogan Regency, which in this case is the Department of Agriculture and Horticulture. The soybean production targeted by the government is 3 tons per hectare, but the realization in the field is only 2.5 tons per hectare, while Indonesia has launched soybean self-sufficiency in the short term. Of course, this situation is very detrimental to the agricultural sector in general. The problem examined in this research is below the target level of productivity because there might be inefficiency in soybean farming. Because efficiency is the relationship between inputs and output, so the output below the target becomes the problem related to the farming efficiency.

The agricultural development policies that have been implemented either by the government or other parties are considered not to be able to increase the ability of the agricultural sector in Grobogan in supporting the economy; a series of policies that have been programmed and implemented also seem not to be able to reach the farmers at lower level. Therefore, based on the formulation of the problems above, the research questions are as follows:

1. How is the general description of soybean farming in Grobogan Regency?
2.What kinds of production factors that influences the production of soybean farming in Grobogan?
3. How is the efficiency level of the use of production factors on soybean farming in Grobogan?

2. LITERATURE REVIEW

2.1. Efficiency

Efficiency can be classified into 3 types, those are: technical efficiency, allocate efficiency (price efficiency) and economic efficiency (Soekartawi, 2001). The use of production factors is called the technical efficiency if the production factors produce the maximum one. Dhakal (2015). It is called the price efficiency or allocates efficiency if the value of the marginal product is equal to the price of

production factors. It is called the economic efficiency if the agricultural business can reach the technical efficiency as well as the price efficiency.

In its application, Yotopoulos and Nugent (1976) in Budi Setiawan (2008), explains the concept of efficiency, that is a concept for all activities to be more modest. The concept of efficiency is divided into 3 types; those are the technical efficiency, the price efficiency, and the economic efficiency.

A farmer is said to be more technically efficient than the others if he can produce physically higher using the same production factors. Whereas a farmer can reach the price efficiency if he is able to maximize the profits (able to equalize the value of the marginal product of each factor with the variable production costs). The economic efficiency can be reached if both the technical and price efficiencies are also efficient.

2.2. Cobb Douglas production function with stochastic frontier production approach

Stochastic frontier production was first developed by Aigner, Lovell and Schmidt (1997) and Mercusen and van den Broeck (1977) in Budi Setiawan (2008). The details enable the component of non-negative random on error term to produce a measure of technical efficiency, or the actual ratio to obtain the expected maximum output, where the input and the technology are already known. The detailed structure can be expressed as follows:

$$Y_{it} = f(X_{it}, \beta, t)\ e^{v_{it} - u_{it}} \qquad (1)$$

At the t year, Y_{it} is the output, X_{it} is the input vector and $\beta$is the estimated parameter vector. The error term V_{it} is usually assumed to be distributed independently and identified as N (0, isσ_v^2) on the output related to factors outside the company's control, such as weather. Error term u_{it} captures the technical inefficiency in production, it is assumed in the specific company, non-negative random variables are independently distributed as the intersection of the distribution N (μ_{it}, σ^2_{it}). This follows Battese and Coelli (1995) in Yulianik (2006).

$$\mu_{it} = \delta_0 + z_{it}\delta(1)$$

For the basic case, the technical efficiency of a particular company (specific) in a given year can be defined:

$$TE = \frac{\mathbf{E}\left\langle \mathbf{Y}_{it} \mid \mathbf{u}_{it, X_{it}} \right\rangle}{\mathbf{E}\left\langle \mathbf{Y}_{it} \mid \mathbf{u}_{it=0, X_{it}} \right\rangle} = \mathbf{e}^{v_{it} - u_{it}} \qquad (2)$$

The technical efficiency measure is based on certain expectations that can be seen from the equation (k). This equation gives the value v_{it} - u_{it} that is estimated on the measure of the maximum value of the existing models; the expected maximum value of $Y_{it}$is equal to the conditions when u_{it} equals to zero. The average technical efficiency of the whole company can be defined as follows:

$$TE = \left\{ \frac{1-\phi[\sigma_u - (u/\sigma_u)]}{1-\phi(u/\sigma_u)} \right\} = e^{-u+\frac{1}{2}\sigma_{it}^2} \quad (2)$$

Where $\phi(.)$ shows the density function for a standard normal variable.

2.3. Previous Research

The result of the research "Efficiency Analysis of Gillnet Fishing Gear in Pemalang Regency in 2005" (Susilowati and Sutanto, 2005) is the technical efficiency value of 0.880. It means that the use of gillnet fishing gear by the fishermen in Pemalang has still not been technically efficient yet. However, the result of a calculation of price efficiency is 1.82;it shows that the method of gillnet fishing gear is not efficient in price so it is necessary to increase the production factors.

The calculation result of economic efficiency is 1.601;it means that the use of production factors is not economically efficient. So, it needs the additional input. Then it reaches the value of R / C ratio of 1.32. It shows that it is profitable to keep the business of gillnet fishing gear continuously managed.

Based on the calculation from previous research, "Efficiency Analysis of cotton commodity production in South Sulawesi" by Amirudin Sham, it reaches an efficient result of production of 0.70%. It shows that the cotton farming has not been efficient yet. But it can be continuously developed to reach the efficiency improvement. The breakeven point of analysis result shows that the price of local cotton is Rp.1.947 / kg. It means that the farmer does not lose the production rates decreasing to 7.28% of the average price they receive (the actual price). While the TIH transgenic cotton in Bulukamba Regency still gives profit when the production price decreases to Rp. 1.285.

According to previous research by Vu (2004) on "Efficiency of Rice Farming Households in Vietnam: A DEA With Bootstrap and Stochastic Frontier Application" The study was conducted to estimate the technical efficiency obtained from the data processing using the tools of Data Envelopment Analysis (DEA) and stochastic frontier approach to farming households in Vietnam. The method of these two analysis tools is used to provide statistically precision values of efficiency with DEA estimator. The use of both methods at the same time is generally not used in the empirical analysis although this is an important statistical tool to improve the accuracy of estimation. The technical efficiency is modeled from the production function of farmers' households. The results of deterministic efficiency of parametric statistics (stochastic frontier) and non-parametric statistics (DEA) indicate between different things. The level of basic education and regional factors significantly influences technical efficiency. In addition, the efficiency analysis shows that much farming in Vietnam are less technically efficient than the optimal scale, especially in the central region.

3. METHODOLOGY

3.1. Population

According to Sudjana (1996: 6), population is the totality of all possible values, the result of counting and measuring quantitatively or qualitatively about the certain characteristics of all members of the complete and clear group that want to be learnt. Considering that rice, corn, and soybeans are seasonal crops grown by farmers in all Grobogan, the population of this study is the farmers in Grobogan who are the members of farmer groups and have their own arable land either leased land or their own land amounted to 159.884 people.

3.2. Sample

In the sampling process, in order to calculate the efficient use of soybean production factors, the researchers use a sample of 90 farmers with a snowball sampling technique. The reason of this 90 sample is because during the interview process the respondents' answers tend to the homogeneity by the 90^{th} sample. The respondents are farmers who have cultivated land either private or leased land.

3.3. The farm production function model of soybeans with a stochastic frontier production approach

The model used in this research is the production function model with stochastic frontier production approach of 8 variables. The mathematical model of the production function of rice farming, corn, and soybeans with a stochastic frontier production approach in this research is:

Soybean Farming: $LnY = b_0 + b_1LnX_1 + b_2LnX_2 + b_3LnX_3 + b_4LnX_4 + b_5LnX_5 + b_6LnX_6 + b_7LnX_7 + b_8LnX_8 (V_1-U_1)$

Table 3. Definition of Variable

			Soybean Farming	
1	Dependent	Y	Production	Rp, Kg
2	Independent	X_1	Land Area	Rp, Hectare
		X_2	Seed	Rp, Kg
		X_3	UREA Fertilizer	Rp, Kg
		X_4	TSP Fertilizer	Rp, Kg
		X_5	Phonska Fertilizer	Rp, Kg
		X_6	Labors	Rp, Hours/Work
		X_7	Medicine type 1 (score)	Rp, Liter
		X_8	Medicine type 2 (atabron)	Rp, Liter
		b_0	Interception	
		b_1-b_8	Regression Coefficient	

4. RESULTS AND DISCUSSION

4.1. General Description of Farmers in Grobogan

Almost all farmers in Grobogan are the members of farmer groups. The government's rule suggesting the farmers to affiliate into the farmer group gives implications for the farmers as a whole. Farmers in Grobogan become more organized and better understand the managerial concepts and more capable to actualize themselves with market conditions and technological advances. In addition, the farmer groups also bring profits to the farmers in Grobogan, among others, they can get subsidized fertilizer from the government because it is only distributed to the farmer groups. In addition, they also more frequently get extension from the agricultural extension because they have organization that holds regular meetings.

4.2. General Description of Soybean Commodity

For this kind of soybean commodity, the soybean farmers in Grobogan usually use the type of Grobogan variety soybean seed. Such soybean variety is the development of Malabar soybean varieties developed in Grobogan, so now more farmers plant this kind of soybean. Soybean farmers prefer this Grobogan variety soybean because it is technically more resistant to the disease; it has fast harvest time and a very good quality of the resulting seed. Besides, it is a variety that is created and developed in its own area.

Marketing for soybean commodity is very broad. Soybean farmers usually sell their soybean yield from the farm. The middlemen usually have to wait and transact in the farm. The selling price of soybeans follows the selling price in the market in general. So both farmers and middlemen cannot influence the price. Soybeans that have been absorbed from the market would normally be sold to the warehouses to be sent out of town. Soybean market from Grobogan has penetrated the market outside the province.

4.3. Soybean Farming Efficiency

In this research, the calculation of technical, price, and economic efficiencies of rice, corn, and soybean farming is carried out with computer software tools frontier 4.1.c., while for the price efficiency, it is calculated manually by finding the value of net profit margin of each variable that affects the production of rice, corn, and soybean farming. For economic efficiency, it is obtained by multiplying the value of technical efficiency and price efficiency.

Based on the result of the data processing, it is known that soybean farming in Grobogan also has still not been efficient yet in technique, price, and economy. However, the efficiency level of the corn farming is still under the rice and soybean farming. Inefficient use of production factors of technique, price, and economy describes that actually there is still a real problem in the performance of rice, corn, and soybeans in Grobogan.

4.4. Technical Efficiency of Soybean Farming

The definition of technical efficiency is the relationship between the level of using the input and output. When being linked with the farming production, the technical efficiency is the relationship between the production factors used by the farmers with the obtained yields, whether the input issued is equivalent to the produced output. The notation from 0 to 1 expresses the technical efficiency.

Based on the result of the data processing with software frontier 4.1c it is known that the level of technical efficiency of soybean farming is at 0.9619. Therefore it can be concluded that soybean farming has still not been technically efficient yet. It is because the value of technical efficiency of soybean farming is still smaller than 1.

Soybean farmers are still not considered to optimize the use of production factors so technically it cannot reach the efficient point. The use of production factors in rice, corn, and soybean farming are too excessive, consequently the production activities are less optimal. The excessive use of production factors will cause the plant growth obstructed.

However, it is actually reasonable enough for the farmers to do this because based on the research result in the field, it is known that they should increase the supply of fertilizers and medicines to the plants so they must maintain the plant to grow optimally so as not damaged during the harvest and can maximally produce.

Farmers in Grobogan are still not able to utilize their production factors so it makes the farming they are running not technically efficient in rice, corn, and soybean commodities. The level of technical efficiency of less than 1 indicates that farmers are generally too much in the use of production factors so it causes inefficiency. They need to reduce the use of production factors to improve the efficiency of soybean farming.

Farmers are too much in the use of production factors so this makes it not proportional. This condition causes inefficiency. They commonly consider that the provision of production factors such as giving many fertilizers would improve the production especially when there is no rain. When the rain does not come too long, the farmers will often do the plant watering. When they do the plant watering, they will mix the water with fertilizers, medicines in large numbers and sometimes out of proportion. This causes technical inefficiency in farming. Moreover, the more frequent they do the treatments like watering, the more labors they need. However, it is not counterbalanced by the high yields. Harvested farm does not produce a lot or is not balanced with the expenditures for production factors.

4.5. Price Efficiency of Soybean Farming

Price efficiency is a condition in which the value of marginal productivity (NPM) of each input and the input price is equal to 1.It means how the manufacturers can maximize the profits. Based on the results of this research, by calculating the Net

Profit Margin (NPM) for each variable, it can be found that the farming of rice, corn, and soybeans in Grobogan has still not been efficient yet in price. It can be seen from the table below that NPM value for each variable for each commodity is greater than 1, which means that all production factors of farming have still not been efficient yet in price.

Based on the calculation of the value of the net profit margin (NPM) for soybean farming in Grobogan, to see the level of price efficiency, it is known that soybean farming has not been efficient yet in price. It is showed by the total value of 1.7343 NPM. NPM value for each variable is also greater than 1. This condition implies that the use of each of the production factors also has still not been efficient yet in price. Soybean farmers in Grobogan are considered not to be able to maximize the profits because they have not been able to reach the price efficiency.

Table 4. Price Efficiency of Rice, Corn, and Soybean Farming

No.	Variable	NPM (soybean)
1	Land Size	2.83
2	Seed	-4.03
3	Urea Fertilizer	6.08
4	TSP Fertilizer	-13.03
5	Phonska Fertilizer	5.01
6	Labors	2.17
7	Medicine type 1	-111.42
8	Medicine type 2	126.265
Price Efficiency		**1.7343**

Source: Primary data processed

4.6. Economic Efficiency of Soybean Farming

Based on the calculation of economic efficiency for soybean farming in Grobogan,it obtains that the value of economic efficiency is 1.66. It means that soybean farming has also not been economically efficient yet. This condition is the same as the calculation results of the technical efficiency and the price efficiency, which states that soybean farming, has not been efficient yet in technique and price. Therefore, it is necessary to increase or decrease the use of production factors both in terms of technical composition and optimization of profits in order to reach the level of efficiency or at least to increase the level of efficiency.

4.7. Discussion

Soybean is a superior commodity from various agricultural commodities in Grobogan Regency. This situation makes soybeans be one of the most marketable commodities among other commodities; because Grobogan is the center of soybeans in Central Java, so the main market of soybeans in Central Java is

situated in Grobogan. There is one national variety of excellent soybeans called Grobogan variety; it is called so because this variety is developed in Grobogan or more precisely in Pulokulon District.

Table 5. The result of Technical, Price, and Economic Efficiency of Soybean Farming

	Technical	Price	Economy
Efficiency Value	0.9619	1.7343	1.66
Explanation	Not efficient	Not efficient	Not efficient

Source: Primary data processed

Based on the research result, the soybean farming in Grobogan has still not been efficient yet in technique, price, and economy. This condition indicates that the use of production factors on soybean farming in Grobogan needs to be optimized by reducing the technical use and maximizing the profits in order to reach the price efficiency. Along with the above result, Puspitasari (2008) also states that soybean farming in Grobogan also has not been efficient yet in technique, price, and economy. So it is necessary to optimize the use of production factors to reach the efficiency of maize farming.

From the research result on the field, it is known that there are many problems related to soybean farming. Soybean farmers in Grobogan often use not proportional production factors. They use too much fertilizer like Urea, TSP and Phonska in caring for the plants. Besides reducing the soil fertility, this condition also brings impacts to the plants in like being susceptible to the disease due to less healthy soil conditions and being susceptible to excessive chemical contamination. Farmers initially assume that the provision of large amounts of fertilizer will make soybean crops become more and more. But otherwise, this condition instead it reduces soil fertility.

The excessive use of production factors besides technically makes the soil condition decreased also makes the production cost paid by the farmer become increasingly larger. Indeed the soybean farming only takes less than three months to come to the harvest, it means that farmers can save time between two weeks, but the short time of harvest has no impact on reducing the production cost. The need of production factors will still a lot because the characteristics of soybean plants technically need higher maintenance cost, particularly for the labors and medicine. This condition makes the farmers cannot maximize the potential profit because the soybean farming can be inefficient in price.

In soybean farming, most farmers commercialize the agricultural activities on their own land, although there are also leased lands under cultivation. Similar to the leased concept on the rice farming, the leased land for soybean farming is commonly from the village land leased with the annual auction system. The rental price of land is determined by the location of the farm. Land that has a high fertility rate, close to the irrigation network, will have a high rental value. Von Thunen theory

says that the price of land will be more expensive if the location is close to the highway, but this is slightly different from the real condition, which shows that agricultural land will be more expensive if it is close to a network of irrigation (irrigation) and has the high fertility rates. In accordance with this, David Ricardo states that the rental value of the land will be more expensive if it has a high fertility rate and close to the irrigation network. However, because the location of the fields for soybean farming is not an irrigation network, the rental price of land is determined by soil fertility. Farmers commonly determine the level of soil fertility from the information about the average production of the agricultural land. Information about the yields is usually easy to find by in the villages.

Soybean farmers in Grobogan are already using the superior seeds and the labeled ones. Even the soybean variety cultivated is the local one but with superior quality. So the planted seeds certainly have the good quality too. However, the excessive use of the seeds is also considered to be the cause of inefficiency in Grobogan soybean farming. Based on observations and explanations of soybean farmers, they sometimes have to repeat sowing the seeds due to the pests and because the seeds cannot grow due to the lack of water or fertilizer. It encourages the farmers to spend additional production costs again that lead to inefficiency.

Provision of fertilizer is also a concern related to the inefficiency of soybean farming in technique, price, and economy. All this time the farmers can meet the urea fertilizer through the subsidized fertilizer. They do not need too much fertilizer of TSP and Phonska because both fertilizers are only complementary. So although it is not subsidized by the government, the production cost is not so significant because there is no many implications of the need for both types of fertilizer. In practice all this time the subsidized fertilizer is only for those who belong to the members of farmer groups. In fact, farmers often lack of urea fertilizer supply. It is because the allotments they receive are not proportional. It frequently occurs that fertilizer is rarely found in the market by the planting season. Farmers who originally count on the farmer groups to meet the fertilizer needs are forced to buy unsubsidized fertilizer. Of course the price is more expensive, moreover, the fertilizer will be scarce by the planting season so the farmers are forced to buy them with more expensive price.

Production theory developed by Nicholson states that the use of raw materials would increase the production. One of the raw materials in the farming is fertilizer. So based on the production theory of Nicholson, the more the use of raw materials is, the more the yields will be. However, the excessive use of fertilizer will actually make the production decrease and lead to inefficiencies of soybean farming. Condition of the soil becomes saturated and concentrated with chemical elements so that the level of soil fertility decline. So in this case the production function of Nicholson must be applied proportionally to reach the level of efficiency of soybean farming.

The excessive use of labor and the needs of big hours of work are also the reason why farming has not been efficient yet. Indeed the soybean commodity needs more intensive treatments than other commodities. This makes the use of labor tend to be greater than other commodities. Big allocation of working hours also has an impact on the high labor costs that must be paid although family members perform sometimes soybean-farming activities. But it still needs daily-wage labors to complete a series of technical work such as watering, plant caring and harvesting. The high amount of wages and the big allocation of working hours have not been able to balanced by the high soybean production and the farmers' income. This makes the soybean farming have not been efficient yet technically and in price, which the combination of technical and price inefficiency makes soybean farming has not been economically efficient yet.

In common rural areas there is frequently an excess of labor supply to the agriculture sector or different from the urbanization concept, which states that in case of urbanization, the village will be lack of labors. However, the empirical phenomena show that although the rate of urbanization in Grobogan is high, the excess of labors to the agricultural sector remains the case. But in fact, people who are young, while the old ones usually fill the excess of agricultural labors generally perform urbanization. The excess of labors is a potential one as being expressed in the production theory of Nicholson and cobb-douglas, which state that the addition of labors (L) will increase the production (Y), but the research results shows that the use of labors actually makes it inefficient if the use continues to be added; it does not mean to increase the output. This condition is possible because of the characteristics of the labors that have been old and less productive anymore, so increasing the number of labors will increase the burden of labor costs.

The soybean farmers' using the medicine excessively also becomes the cause of inefficiency in Grobogan soybean farming. As mentioned, the soybean farmers need more care for their soybean crops, one of which is spraying the medicine regularly. The farmers' ignorance in using the medicine more proportionally makes soybeans unhealthy. Using the spray medicine excessively also makes soybean pests become resistant and more resistant to the anti-pest and disease medicine. For example, some soybean farmers have complained the insect pests that cannot be eradicated in spite of using the big proportion of medicine. This is because the insect pests have been familiar with the medicine given earlier so it makes them more resistant.

5. CONCLUSION

From the research being carried out, it can be concluded that soybean farming has still not been efficient yet in technique, price, and economy. This is indicated by the value of the technical efficiency of soybean farming of 0.9619, the price efficiency of 1.7343 and the economic efficiency of 1.66. Therefore, it is necessary to technically reduce the use of production factors to reach the efficient condition.

The farmers are expected to be able to use and utilize the production factors they own proportionally to become more efficient and profitable, and this can be done by learning about farming methods as it is associated with the technical aspects of cultivation. They should also be more creative in carrying out their business activities such as the use of manure that is benignant for the soil, willing to accept new knowledge given to them, and changing the mindset of the old farmers.

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