GSJ: Volume 12, Issue 5, May 2024, Online: ISSN 2320-9186
www.globalscientificjournal.com

# OPTIMIZATION OF THE USE OF PRODUCTION INPUT IN AN EFFORT TO INCREASE SOYBEAN SEED PRODUCTION RESULTS

Yuli Saputra[1)], Aliudin[2)], Asih Mulyaningsih[2)]

[1)] Doctoral Student in Agricultural Sciences, Sultan Ageng Tirtayasa University
[2)] Postgraduate Lecturer in Agricultural Sciences, Sultan Ageng Tirtayasa University[1]

*ABSTRACT*

*Soybeans are a commodity that is very much needed for the agricultural industry in Indonesia because soybeans are important raw materials for industries such as the tempeh, tofu, soy milk and other food industries. The objectives of this research are: 1) to describe in detail the performance of soybean seed farming, 2) to examine the influence of each input (seed, labor and use of fertilizer) on soybean production both partially and simultaneously, and 3) to determine the efficiency of using production inputs soybean seeds. This research method uses explanatory descriptive. The research was carried out over a period of 3 months, starting from October to December 2023. The research locations were in 6 sub-districts in Serang Regency with respondents from department heads, agricultural instructors, experts and farmers spread across 6 sub-districts in the Serang Regency area. The analytical tool in this research uses a modified Cobb – Douglas production function model. The results of the research show that the general age of farmers is 45-54 years (37%), the general education level is elementary school (53%), farming experience is 1-3 years (69%), and the number of family dependents is 1-3 people (78%). %). The partial use of urea fertilizer, NPK fertilizer, phosmit organic fertilizer, labor and land area does not have a significant effect on soybean production in Serang Regency, however, based on the results of simultaneous analysis of input factors (production factors for urea fertilizer, NPK fertilizer, phosmite organic fertilizer , labor, and land area) have a significant effect on soybean production in Serang Regency. The efficiency of using inputs for the production of urea, soybean seeds and land is classified as inefficient, while the use of production inputs for NPK, Phosmite and labor is classified as inefficient.*

***Keywords***: *Optimization, Production Input, seeds, Soybeans.*

# Introduction

The agricultural sector is an important sector for driving the Indonesian economy. Apart from producing food to meet community needs, this sector is also expected to strive to develop a pattern of linkages between upstream and downstream. Real conditions show that the Indonesian agricultural sector in terms of production is the second most influential sector on national economic growth, after the processing industry. According to Hendra (2022), the position of the agricultural sector is still above other sectors, such as trade and construction. In the third quarter of 2021 the agricultural sector contributed positively to the Indonesian economy. The contribution of the agricultural sector still has opportunities to be increased by strengthening integration of upstream (backward linkage) with downstream (forward linkage).

The development of the agricultural sector can be said to continue to progress, but if studied more deeply, the process is still hampered by several problems, one of which is a decline in production and productivity. This decline in production will cause a scarcity in the availability of agricultural raw materials, so that the scarcity of these raw materials will hinder the agricultural industry. One of the commodities currently experiencing the phenomenon of scarcity of availability is soybeans. Soybeans are a commodity that is very much needed for the agricultural industry in Indonesia because soybeans are important raw materials for industries such as the tempeh, tofu, soy milk and other food industries. Soybeans are a commodity that has downstream strength, but is not supported by upstream strength, so the growth and development of the soybean industry is very dependent on the availability of imported soybean raw materials.

Agro-climatically, soybeans are a suitable crop and can grow optimally in Indonesia, but most farmers still have little interest in cultivating soybeans. The development of domestic soybean production still faces several problems, including: 1) Efforts to expand the area on new open land generally face the problem of high soil acidity, 2) New open land has a wavy/hilly contour making it vulnerable to erosion, 3) Limited availability of seeds superior quality both in terms of quantity and quality when needed, 4) Limited availability of location-specific technology, 5) Low adoption of technology at the farmer level, and 6) Low level of prices received by farmers which is reflected in the decreasing exchange rate for farmers, (Tahlim et al. al. (2003)). Based on this opinion, soybeans can actually be cultivated by paying attention to limiting factors. The limiting factors put forward by this expert are more technical constraints. More deeply, the limiting factors that guarantee soybean production are not only technical constraints but also other constraints, namely economic constraints, social constraints and policy constraints.

This research focuses on economic constraints using technical indicators of cultivation and cultivation behavior of farmers or in other words millennial agricultural resources. This is in line with the thoughts of Atman (2009), who stated that until 2011, soybean production at the farmer level was still low, namely an average of 1.3 t/ha with a range of 0.6 to 2.0 t/ha, whereas Potential yields can reach 3.0 t/ha. Indonesia's low soybean production is caused by a decrease in harvested area. According to Atman (2014), the decline in soybean production was caused by a significant reduction in planting area and the still low national soybean productivity. According to Andayanie (2016), the increasingly narrow planting area and less than optimal land utilization potential for planting soybeans has caused a decline in soybean production in Indonesia. Obstacles that cause a decrease in soybean planting area include: (a) low soybean productivity, (b) underdeveloped soybean seed industry, and (c) low skills of soybean farmers (Atman, 2014). The decline in planting area is a threat to Indonesia's ability to meet domestic soybean needs. The government continues to strive to increase land area and soybean productivity.

The soybean development policy carried out by the government, such as in 2006, the government through the Department of Agriculture launched the Bangkit Soybean program with the program target being to increase national soybean production to reach 1.2 million tons/year with a target harvest area of 760 thousand ha (Tarigan, 2018). Import tariffs are also a policy implemented by the government, this is done to protect domestic soybean producers. The import tariff policy set is an ad-valorem tariff with the tariff amount changing over time (Andayanie, 2016). The government imposed a zero percent tariff on foreign imported soybeans in 2013 through Minister of Finance Regulation Number 133/PMK.011/2013. The elimination of soybean import tariffs was carried out again not only to maintain the stability of domestic soybean prices but also as a form of anticipation of a more severe impact due to the increase in international soybean prices at that time (Tarigan, 2018). Indonesia as an importing country, its people's consumption of soybeans is largely determined by domestic availability.

The availability of domestic soybeans tends to experience problems because its availability is not sufficient for people's needs. Soybean availability is the amount of soybeans available for consumption which comes from the difference between additional production plus imports and minus exports, waste, use of feed and seeds and for non-food industries. This very large productivity gap provides an opportunity to increase production through increasing productivity at the farmer level (Atman, 2009). Therefore, this research reveals the influence of the use of soybean production inputs on soybean seed production. However, soybean production cannot be separated from farmers' behavior in using inputs. The input usage behavior in question is not only volume (dose) but also seen from the combination of production input usage. Based on the achievement of soybean production and productivity in Serang Regency in 2022, it is still not achieved, this is thought to be caused by soybean seed production in 2022 not being optimal.

Farmers' behavior is reflected in their daily actions in environments such as family, community and work environment. Actions that are carried out repeatedly and become ingrained are called behavior. This habit will continue continuously. This behavior can also influence the way farmers think in managing farming which has been carried out for a long time. Farming management, which has been carried out for a long time, is carried out to meet daily needs. Farmers feel needed, therefore an urge or some kind of motivation arises within them. Through a set of knowledge, local communities interact with their environment. The natural resources that are known and managed provide a pattern of behavior for local communities in responding to their environment. Everything is based on their perception of their environment and local natural resources (land, water or rivers, forests, mountains, etc.). This high productivity is thought to also have a high level of technical efficiency. Or in other words, soybean farmers in the Serang Regency area hope to achieve technical efficiency. Based on this description, this research was carried out entitled Optimization Of The Use Of Production Input In An Effort To Increase Soybean Seed Production Results. The hope is that Serang Regency can supply food needs in Indonesia. The objectives of this research are: 1) Describe in detail the performance of soybean seed farming, 2) Examine the influence of each input (seed, labor and use of fertilizer) on soybean production both partially and simultaneously, and 3) Determine the efficiency of input use soybean seed production.



## RESEARCH METHODS

### Type, Location and Time of Research

This research uses explanatory descriptive. According to Sugiyono (2016) explanatory descriptive research is research that will explain the relationship between variables that influence the researcher's hypothesis. This research was carried out over a period of 3 months from October to December 2023. The research was conducted in 6 sub-districts in Serang Regency with respondents from department heads, agricultural instructors, experts and farmers spread across 6 sub-districts in the Serang Regency area. The method used in this research is a deepened survey using observation. The survey method is a type of research that collects various information regarding the symptoms of existing problems by means of interviews assisted by questionnaires (Umar, 2003).

### Population and Sample

The population in this study were soybean farmers who planted the Anjasmoro variety of soybeans in the Serang district, Banten Province, located in 6 sub-districts, namely Padarincang, Cinangka, Anyer, Mancak, Pabuaran and Ciomas sub-districts. The reason for choosing the research location is because farmers agronomically, the land in that location has potential for cultivating soybeans, apart from that, in this sub-district the farmer's contingency in cultivating soybeans is high. The respondents in this study were 64 farmers who cultivated soybeans in Serang Regency. The sample used in this research was taken purposively.

**Method of collecting data**

Data collection techniques used in this research include: Field Research. Conducted to obtain primary data needed in research by direct observation of farmers in soybean commodity development center areas. Field research is carried out in the following way:
a). Observations are observations made by researchers directly on soybean farmers, b). Interviews involve conducting direct questions and answers by asking questions to related parties such as farmers and related stakeholders with the aim of obtaining data or information related to the problem being studied, c). A questionnaire is a data collection method by making a list of questions or statements accompanied by alternative answers, then distributing them directly to respondents so that the results of filling them in will be much clearer and more accurate. Questionnaire used is a closed questionnaire, that is, each question or statement contained in the questionnaire has an alternative answer determined. So respondents cannot provide answers freely.

**Data analysis**

To see the response to the use of soybean production factors, the Cobb – Douglas production function modification model was used. This model modification is also important to use to determine the optimal use of input. The modified Cobb – Douglas production function model is a model commonly used in agricultural economics research because it is practical and easy to transform into linear form (Soekartawi, 2003).
This is confirmed by Gujarati (2001) who states that the regression coefficient shown by the Cobb – Douglas production function is the elasticity of production factors and provides information regarding the effect of scale on results (return to scale). The soybean crop commodity is classified as an annual crop, to see the response to the use of production factors you can use the modified Cobb-Douglas production function.
The modified form of the Cobb – Douglas production function is as follows:

$$Y = b_o x_1^{b1} x_2^{b2} x_3^{b3} x_4^{b4} x_5^{b5} x_6^{b6} E^U$$

If the model is transformed into linear form, the mathematical formulation will take the form:
Ln Y = ln bo + β1ln
Y = Total soybean production
X1 = Number of seeds used (kg)
X2 = Fertilizer use
X3 = Use of labor
β 1- β 6 = Parameters to be estimated
μ = Confounding factor
β 0 = intercept

The Cobb-Douglas production function with coefficients resulting from the production function shows the elasticity of production. The Cobb-Douglas production function can show conditions of increase, namely increasing returns to scale, constant returns to scale, and decreasing returns to scale. Increasing return to scale shows the scale of business with increasing returns. This means that if input is added it will result in an increase in output. In this condition, the production elasticity (εp) >1. Decreasing return to scale shows that the increase in the amount of input is not balanced proportionally by the additional output obtained. In this condition the production elasticity is 0<εp<1. Constant return to scale, shows the scale of business with constant results.

What this means is that adding or subtracting input causes production results to remain constant, in this condition the elasticity of production (εp) = 0.
The level of efficiency in using production factors can be seen in the bi value. In the opinion of Cramer, W. Jensen, and Southgate Jr (2001), βi is an efficiency index that reflects the relationship between production quantity and all production factors used. The level of efficiency in using production inputs can be seen from optimizing production use. Analysis of the efficiency of production factors used in soybean farming using the marginal product approach. This approach is obtained by comparing each marginal product value with the input price with the condition that the value must be equal to one. The formulation is as follows:

$$\frac{NPM_{X1}}{Hx_1} = \frac{NPMx_2}{Hx_2} = \frac{NPMx_3}{Hx_3} = \frac{NPMx_4}{Hx_4} = \frac{NPMx_5}{Hx_5} = \frac{NPMx_6}{Hx_6} = 1$$

NPM = Marginal Product Value
Hx = Input Price,
Marginal Product Value (NPM) can be calculated using the formula:

$NPM = \frac{bixy}{xi} xHy$ , under the condition

bi = regression coefficient or production elasticity

Hy = unit price of production
y = production output
xi = ith production factor
i = 1,2,3,4,5,6……..n
If the ratio of marginal product value to price = 1, it means that soybean farming is efficient, a ratio < 1 is inefficient and a ratio > 1 is not efficient.

## RESULTS AND DISCUSSION

### Soybean Farmer Performance

Farmer characteristics include age, education, farming experience and number of family dependents. This diversity of characteristics can influence farmers' decisions in carrying out soybean farming. The performance of soybean farmers is as follows:

### Age

Age is one of the factors that greatly influences physical ability and productivity in soybean farming. In general, young soybean farmers have relatively better work abilities and physical abilities compared to farmers who are relatively older. The following data regarding the age of the respondent farmers can be seen in Table 1.

**Table 1. Characteristics of Respondents Based on Age**

| Age (years) | Number of Respondents (Person) | Percentage (%) |
|---|---|---|
| 25-34 | 7 | 11 |
| 35-44 | 17 | 27 |

| | | |
|---|---|---|
| 45-54 | 24 | 37 |
| 55-64 | 16 | 25 |
| Amount | 64 | 100 |

Source: Primary data processed, 2024

Based on Table 1 showing the ages of respondents from 64 soybean farmer respondents in Serang Regency, data was obtained which showed that the majority of respondents aged 45 to 54 years had the largest percentage, namely 37 percent. This shows that the majority of soybean farmers in Serang Regency are of productive age. Only 7 respondents were aged between 25 and 34 years, while the respondents with the oldest age range were between 55 and 64 years with a percentage of 25 percent.

**Education Level**

The education of respondent farmers in the research location has a high level of variation, starting from not completing elementary school (SD) up to Strata 1 (bachelor). Farmers who have a higher level of education are thought to be more capable of mastering and adopting technology, because through education they have insight and knowledge. in carrying out soybean cultivation increasingly widely. The following data regarding the education level of respondent farmers can be seen in Table 2.

**Table 2. Characteristics of Respondents Based on Education**

| **Level of education** | **Number of Respondents (People)** | **percentage (%)** |
|---|---|---|
| Not finished | 5 | 8 |
| SD | 34 | 53 |
| SLTP | 21 | 33 |
| SLTA | 3 | 5 |
| S1 | 1 | 1 |
| Amount | 64 | 100 |

Source: Primary data processed, 2024

Based on Table 2, it is known that the highest percentage of education level of respondent farmers is at the elementary school level, 34 farmers or 53 percent. This shows that the average level of soybean farmer respondents in Serang Regency is still low, because the average farmer has only completed education up to elementary school level.

**Farming Experience**

Experience in farming is an important indicator that indirectly contributes to the overall success of farming. Farmers who have experience accompanied by the availability of adequate production facilities have greater ability to overcome technical problems in farming compared to farmers who have just started farming. The following data regarding the farming experience of respondent farmers can be seen in Table 3

**Table 3. Characteristics of Respondents Based on Farming Experience**

| Years of farming (years) | Number of Respondents (People) | percentage (%) |
|---|---|---|
| <1 **years** | 14 | 22 |
| 1-3 **years** | 44 | 69 |
| >3 **years** | 6 | 9 |
| Amount | 64 | 100 |

Source: Primary data processed, 2024

Based on Table 3, it shows that the majority of experience in cultivating soybeans in paddy fields in Serang Regency is most likely 1 to 3 years as many as 44 people with a percentage of 69 percent. This is because farmers are still new to farming compared to other crops such as secondary crops.

**Number of Family Dependents**

Leading a family life means being responsible for meeting the family's living needs, such as food, clothing, school fees, health and so on. The following data regarding the number of dependents of the respondent's farmer family can be seen in Table 4.



**Table 4. Characteristics of Respondents Based on Number of Family Dependents**

| Characteristics | Number of Respondents (People) | percentage (%) |
|---|---|---|
| 1-3 person | 50 | 78 |
| 4-6 person | 13 | 20 |
| >7 person | 1 | 2 |
| Amount | 64 | 100 |

Source: Primary data processed, 2024

Based on Table 4, it is known that the highest percentage is the number of family dependents, namely 1 to 3 people totaling 50 respondents with a percentage of 78 percent. The number of family dependents can influence respondent farmers to cultivate soybeans. This makes farmers carry out soybean farming to be able to meet the needs of their family members. The presence of this number of family dependents can motivate farmers to carry out soybean farming.

**Effect of Use of Production Inputs for Urea Fertilizer, NPK Fertilizer, Phosmite Organic Fertilizer, Labor, Seeds and Land**

The influence of the use of production factors on production can be known by looking at the production function. The Cobb-Douglas function model is used to analyze factors that influence soybean production. The variables used are total soybean production in paddy fields (Y) which is the dependent variable, while the independent variables consist of urea fertilizer (X_1), NPK fertilizer (X_2), phosmite organic fertilizer (X_3), labor (X_4), seeds (X_5) and land area (X_6). Based on the primary data that has been obtained, the data is tabulated and then processed using SPSS 21 to produce regression coefficient values for each independent variable which can be seen in Table 5.

**Table 5. Results of Multiple Regression Analysis**

| Input | Regression Coefficients | Standard Error |
|---|---|---|
| Urea | 0,240 | 0,413 |
| NPK | -0,100 | 0,399 |
| Phosmit | -1,217 | 0,289 |
| Labor | 0,031 | 0,049 |
| Seed | 0,076 | 0,212 |
| Land | 2,118 | 0,325 |
| Intercept ($b_0$) = 1,580 | | |
| $R^2$ = 0,930 | | |
| SE of the Estimate = 0,25876 | | |

Source: Primary data processed, 2024

Table 5 shows that the regression equation that can be formed is as follows:

$$LnY = \ln 1{,}580 + 0{,}240 \ln X_1 - 0{,}100 \ln X_2 - 1{,}217 \ln X_3 + 0{,}031 \ln X_4 + 0{,}076 \ln X_5 + 2{,}118 \ln X_6 \; e$$

The regression function model is still in natural logarithm form, so it must be transformed back into the Cobb-Douglas production function. Mathematically, the Cobb-Douglas production function for soybean farming in Serang Regency is as follows:

$$Y = 0{,}457 \; X_1^{0{,}240} \; X_2^{-0{,}100} \; X_3^{-1{,}217} \; X_4^{0{,}031} \; X_5^{0{,}076} \; X_6^{2{,}118} e$$

The production factors obtained show the elasticity of production. The regression coefficient in the production function shows the elasticity of production. The elasticity of urea fertilizer production (X1) is 0.240. This figure shows that every additional 1 percent of urea fertilizer will increase production by 0.240 percent assuming other predictors are constant. The elasticity of NPK fertilizer production (X2) is -0.100. This figure shows that for every 1 percent addition of NPK fertilizer, soybean production decreases by -0.100 percent, assuming other predictors are constant. The elasticity of phosmite organic fertilizer production (X3) is -1.217. This figure shows that for every 1 percent addition of energy, soybean production decreases by -1.217 percent, assuming other predictors are constant.

The elasticity of labor production (X4) is 0.031, this figure shows that if the labor production factor is added by 1 percent, soybean production will decrease by 0.031 percent assuming other predictors are constant. The elasticity of seed production (X5) is 0.076, this figure shows that if the seed production factor is increased by 1 percent, soybean production will increase by 0.076 percent assuming other predictors are constant. The elasticity of land area production (X6) is 2.118, this figure shows that if the land area production factor is increased by 1 percent, soybean production will increase by 2.118 percent assuming other predictors are constant.

Gujarati (1987) states that the value of b1 + b2 + .... + bn shows return to scale, the return to scale value obtained in Serang Regency is 1.148, meaning that soybean production in rice fields in Serang Regency is in a condition of increasing returns to scale.

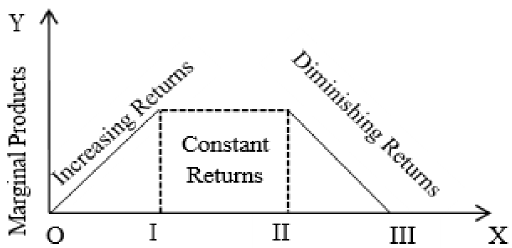


Figure 1 ***Scale of Input***

This situation can be interpreted as meaning that the proportion of additional production factors will result in a larger proportion of additional production, for each production factor added by 1 percent, production output will increase by 1.148 percent. Based on the Cobb-Douglas function model, it can be seen that the parameter value (b) of each production factor means that soybean farming activities in Serang Regency are in a state of increasing returns to scale in production area I. Farmers can add inputs used, so that additional inputs capable of producing soybean production.

Based on Table 5, the R^2 (coefficient of determination or r square) is 0.930, meaning the ability of the independent variables, namely urea fertilizer (X1), NPK fertilizer (X2), phosmite organic fertilizer (X3), labor (X4), seeds (X5) and land (X6) explain the dependent variable, namely soybean production (Y) by 93 percent, while the remaining 7 percent is explained by other variables outside the model such as management variables, climate, capital and so on.

**Effect of Partial Use of Production Factors**

The T test is a test to show how much influence an independent variable individually has in explaining the variance of the dependent variable. A variable is said to have a partial influence on the dependent variable if the T_count value > T_table at a significance level of 5% (α = 0.05). The t test results can be seen in Table 6 as follows:

**Table 6. Partial Test Results (T Test)**

| Variable | Regression Coefficients | $T_{Count}$ | $T_{table}$ | Signifikansi |
|---|---|---|---|---|
| Urea | 0,240 | 0,581 | 2.003 | 0,563 |
| NPK | -0,100 | -0,250 | 2.003 | 0,804 |
| Phosmit | -1,217 | -4,216 | 2.003 | 0,000 |
| Labor | 0,031 | 0,631 | 2.003 | 0,530 |

| | | | | |
|---|---|---|---|---|
| Seed | 0,076 | 0,357 | 2.003 | 0,722 |
| Land | 2,118 | 6,517 | 2.003 | 0,000 |

Source: Primary data processed, 2024

Based on Table 6, it can be seen that the regression coefficient tested using the t test shows that not all production factors have a significant effect on soybean production in Serang Regency. The results of the urea fertilizer t test (X_1) obtained a t count of 0.581. This shows that the partial use of urea fertilizer production factors does not have a significant effect on soybean production in Serang Regency. Using the right amount of urea fertilizer at the right dose produces good quality and can increase production. The t test results for NPK fertilizer (X_2) obtained a t count of -0.250. This shows that the partial use of NPK fertilizer production factors has no real effect on soybean production in Serang Regency. Providing the right dose of NPK fertilizer to soybean production can increase both quality and quantity. The t test results for phosmite organic fertilizer (X_3) obtained a t count of -4.216. This shows that the partial use of phosmite organic fertilizer production factors does not have a significant effect on soybean production in Serang Regency. .
The t test results for labor (X_4) obtained a t count of 0.631. This shows that the partial use of labor production factors has no real effect on soybean production. The results of the t test for seeds (X_5) obtained a t count of 0.357. This shows that the partial use of land area production factors has no real effect on soybean production in Serang Regency. Using good quality and high quality seeds can increase production. The results of the t test for land area (X_6) obtained a t count of 6.517. This shows that the use of land area production factors partially has a real effect on soybean production in Serang Regency. Land for farmers is the initial capital to run their farming business. The larger the land used for soybean farming, the resulting production will also increase.

**Effect of Simultaneous Use of Production Factors**

The F test is used to determine how much influence the use of inputs, namely urea fertilizer, NPK fertilizer, labor, seeds and land area simultaneously has on soybean production in rice fields in Serang Regency.

**Table 7. F Test Results**

| Model | Df | $F_{hitung}$ | $F_{tabel}$ | Signifikansi |
|---|---|---|---|---|
| Regresi | 6 | 126,87 | 2.26 | $0{,}000^{b}$ |
| Residual | 57 | | | |
| Amount | 63 | | | |

Source: Primary data processed, 2024

Based on the results of the regression analysis in Table 7, the calculated F obtained for soybean production in Serang Regency is 126.87 with a confidence level of 95 percent. Where the calculated F value (126.87) is greater than the table F value (2.26), meaning the use of inputs, namely urea fertilizer ($X_1$), NPK fertilizer ($X_2$), phosmite organic fertilizer ($X_3$) , labor ($X_4$), seeds ($X_5$), and land ($X_6$) simultaneously have a significant effect on soybean production in Serang Regency.

**Allocative Efficiency of Use of Production Inputs**

Price efficiency analysis shows the level of efficiency of inputs used for soybean farming on rice fields in Serang Regency. Soekartawi (2010) states that efficiency can be obtained if the marginal product value (NPMx) for input (X) is the same as the input price (Px). The results of the analysis of the level of efficiency of soybean farming in the cultivation system in the rice fields of Serang Regency are presented in Table 8 and Table 9.

**Table 8. Efficiency of Using Production Factors**

| Input | Px (Rp) | NPMx | $\frac{NPMx}{Px}$ | Information |
|---|---|---|---|---|
| Urea | 2.250 | 27.021 | 12 | Not yet efficient |
| NPK | 2.300 | -11.258 | -4,9 | Not efficient |
| Phosmit | 60.000 | -298.829 | -4,9 | Not efficient |
| Labor | 80.000 | 64.340 | 0,8 | Not efficient |
| Seed | 16.000 | 22.413 | 1,4 | Not yet efficient |
| Land | 1.000.000 | 29.122.500 | 29,1 | Not yet efficient |

Source: Primary data processed, 2024

The efficiency value of the urea fertilizer production factor is classified as not yet efficient, because it has a value of more than 1, namely 12. This is because the use of urea fertilizer is not optimal, so it is necessary to add additional input to achieve efficiency. The use of NPK fertilizer production factors is inefficient, so it is necessary to reduce NPK fertilizer input to achieve efficient figures. The use of phosmite organic fertilizer production factors is inefficient, so it is necessary to reduce NPK fertilizer input to achieve efficient figures.

The efficiency value of the labor production factor is classified as inefficient, because it has a value of less than 1, namely 0.8. To achieve efficiency, it is necessary to reduce labor input. The efficiency value of seed production factors is not yet efficient, seed use still needs to be increased to reach efficient figures. The addition of seed production factors must be in accordance with the area of land planted. Farmers rely on seeds from government assistance. The seeds used are sometimes not old seeds but seeds that are still young and appear hollow. These different qualities can cause the use of seeds to be inefficient.

The average area of land planted by farmers in soybean cultivation in the rice fields of Serang Regency is only 1.1 ha. To be efficient, respondents need to increase the area of land planted. Farmers can increase the area of land by renting it, in addition to land intensification.

**Table 9. Input Efficiency of Soybean Cultivation Production in Serang Regency**

| Variable | Bi | Y | Py (Rp) | Px (Rp) | $\bar{X}$ | Unit |
|---|---|---|---|---|---|---|
| Urea | 0,240 | 1,1 | 10.000.000 | 2.250 | 1173 | Kg |
| NPK | -0,100 | 1,1 | 10.000.000 | 2.300 | -478 | Kg |
| Phosmit | -1,217 | 1,1 | 10.000.000 | 60.000 | -223 | L |
| Labor | 0,031 | 1,1 | 10.000.000 | 75.000 | 4 | HKP |
| Seed | 0,076 | 1,1 | 10.000.000 | 16.000 | 52 | Kg |
| Land | 2,118 | 1,1 | 10.000.000 | 1.000.000 | 23 | Ha |

Source: Primary data processed, 2024

Based on Table 9, it shows that the use of urea fertilizer production input is not yet efficient, to be efficient it is necessary to add 1,173 kg of urea fertilizer, the seed production input is not yet efficient so to be efficient it is necessary to add 52 kg of seed input, then the land production input is not yet efficient, to be efficient it is necessary added land input needs to be expanded by 23 ha, while for the input use of NPK fertilizer, phosmite fertilizer and labor is inefficient so it is necessary to reduce the amount of production input used by 478 kg in NPK fertilizer production input, the use of phosmite fertilizer production input needs to be reduced by 223 kg and reduce use of labor production input of 4 HKP. If an input is added, there will be an increase in output, whereas if an input is continuously added, the resulting production will decrease, assuming other predictors are constant.

## CONCLUSION

1. Performance of soybean seed farming is generally farmer age is 45-54 years (37%), general education level is elementary school (53%), farming experience is 1-3 years (69%), and number of family dependents is 1-3 people (78% ).
2. The partial use of urea fertilizer, NPK fertilizer, organic phosmite fertilizer, labor and land area does not have a significant effect on soybean production in Serang Regency, but based on the results of simultaneous analysis of input factors (production factors for urea fertilizer, NPK fertilizer, fertilizer organic phosmite, labor, and land area) have a significant effect on soybean production in Serang Regency.
3. The efficiency of using inputs for the production of urea, soybean seeds and land is classified as inefficient, while the use of inputs for the production of NPK, Phosmite and labor is classified as inefficient.

## BIBLIOGRAPHY

A, Herath H. M. Mahmood, Rosli. 2017. Dimensions of Entrepreneurial SelfEfficacy and Firm Performance. Global Journal of Management and Business Research: Administration and Management. Volume 14 Issue 4. Online ISSN: 2249-4588 & Print ISSN: 0975-5853

Aliudin. 2020. Economics of Agricultural Production. Indonesian Educational Media Publisher, Banten.

Aliudin, Sendjaja P.T, Sariyoga.S, Wibowo.S.A and Krisdianto N. 2015. Applied Production functions Cobb-Douglas on home industry of palm sugars: case of Cimenga Village, Cimenga District, Lebak Region, Banten Province, Indonesia. African Journal of Agricultural Economics and Rural Development. 3(3):214-216.

Andayanie, W.R., Y. B. Sumardiyono, S. Hartono & P. Yudono. 2011. Incident of soybean mosaic disease in East Java Province. J. Agrivita. 33(1): 15−22.

Atman. 2009. Strategy for Increasing Soybean Production in Indonesia. Scientific journals Tambua VIII (1): 39-45.

Buhaira and Akmal. 2018. The Effect of Providing Dolomite and Manure On the Growth and Yield of Soybean Plants on Dry Land Ultisol. Journal of the Faculty of Agriculture, Jambi University.

Cramer, G. L., W. Jensen, Clarence, and Southgate Jr, D. D, 2001. Agricultural Economics and Agribusiness. John Wiley and Sons, Inc. New York. Chichester, Weinheim, Brisbane, Singapore and Toronto.

Debertin, D. L. 1986. Agricultural Production Economics. Macmillan Publishing Company. United States of America.

Destasari et al. 2015. "The Influence of Domestic Soybean Production and Prices World Soybeans Against the Volume of Soybean Imports in Indonesia (Study Against Soybean Import Volume 1996-2013)". Admissions Journal Business.

Gujarati. 2001. Basic Econometrics. Publisher: Erlangga, Jakarta.

Hanafie, Rita, 2010. Introduction to Agricultural Economics. Yogyakarta: ANDI.

Hendra K. 2009. Production Management: Production Planning and Control. Edition 4. Yogyakarta: ANDI.

Isnowati, S. 2014. Factors influencing soybean production in the village Kebonagung, Tegowanu District, Grobogan Regency. J. SEPA. 10 (2) : 177-185

Irwan A.E. 2006. Cultivation of Soybean Plants (Glycine Max (L.) Merill). Publishing Institution, Faculty of Agriculture, UNPAD. Bandung.

Mahdi, Naufal Nur. Suharno. (2019). Analysis of Influencing Factors Soybean Imports in Indonesia. Agribusiness Forum (Vol. 9, No. 2, September 2019) Pg. 160 – 184. ISSN 2252-5491, E-ISSN 2656-4599.

Mahdoh and Risyanto, H. 2018. Analysis of the Effect of Soybean Consumption, Production Soybeans and Foreign Exchange Reserves on Soybean Imports in Indonesia. I-Economic Journal Vol. 4.No 2. Pages 180-193.

Mulyono, S, 1996 Decision Making Theory, Revised Edition, Publishing House UI Faculty of Economics, Jakarta.

Nadya G, Rahma N, Candra M. 2021. Analysis of influencing factors soybean imports in Indonesia. Industrial and Monetary Trade E-Journal (Vol 9, No. 2).

Santoso B and M. Haryanto, Rainisa. 2017. "Planning and Control Production 1". Bandung: Alphabeta.

Sari, Princess Meliza. (2015). Analysis of factors influencing consumption soybeans in Indonesia. Journal of Economics and Economic Education, 4 (1), 30- 41.

Septiatin, A. 2012. Increasing Soybean Production in Dry Land, Rice Fields, and Ups and down. Yrama Widya, Bandung.

Sitorus, Sri Ayuni. (2020). Analysis of Factors Affecting Volume Imports of Indonesian Soybeans. http://repositori.usu.ac.id/ [17 April 2021].

Sofia, D. 2007. Response of Soybean Plants (Glycine max(L.) Merrill) to Soil Masam. USU Repository 2007.

Soekartawi, 2003. Economic Theory of Production with Analysis Subjects Cobb-Douglas function. Publisher PT. Raya Grafindo Persada, Jakarta

Sugiyono, 2013, Quantitative, Qualitative and R&D Research Methodology.(Bandung:ALFABETA)

Sukartawi. 1994. Basic Principles of Agricultural Economics: Theory and Application. PT. Raja Grafindo Persada. Jakarta.

Tahlim, S, Rusastra, W. I and Saptana (2003). Economic Development Perspective Soybeans in Indonesia. Agro Economic Forum, Volume 19 No.1, July 2001 Bogor Socioeconomic Research and Development Center.

Sign and Asnawi. 1977. Microeconomic Theory. Department of social sciences agricultural economy. Bogor Agricultural Institute.