RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 7(151), July 2024

UDC 332

PRODUCTION FACTORS AFFECTING OF RICE FARMING IP 400 IN SUKOHARJO DISTRICT, INDONESIA

Aristiani Rachel Tika, **Ferichani Minar**, **Barokah Umi**
Faculty of Agriculture, University of Sebelas Maret, Indonesia
*E-mail: racheltika@gmail.com

ABSTRACT
Ministry of Agriculture has initiated the IP 400 program, which aims to ensure adequate rice supplies in the country. This program promotes the idea of planting rice repeatedly throughout the year using short-term rice varieties, especially on land that is irrigated throughout the year. Sukoharjo District, with a land area of 10,000 hectares, is one of the priority areas in this program. This study pursues to investigate the factors affecting from rice production with IP 400 cropping system in Sukoharjo District. In addition, this study will also discuss land management and irrigation techniques that can improve production efficiency. The purposive sampling method was used to select 90 farmers as samples in this research. The collected data was then analyzed using stochastic frontier analysis utilizing the maximum likelihood estimation (MLE) method via Frontier 4.1 software. The results of the analysis indicate that land area with coefficient values 4,160; pesticide use with coefficient values 0,004; and labour with coefficient values 0,069 are significant factors influencing the results of rice production in the IP 400. Then, seed use with coefficient value 0,010 and inorganic fertlizers with coefficient values 0,002 havent significant effect on production yields.

KEY WORDS
Technical efficiency, Crop Index 400 (IP 400), rice production.

Rice is a very vital food crop for Indonesia, playing a very important role in meeting the country's food needs. Based on data from the Ministry of Agriculture in 2022, rice production will reach 32,074,045 tons, while the average consumption of rice per individual will reach 94 kg each year (Ministry of Agriculture, 2022). This indicates how highly dependent the Indonesian people are on rice as the main food source. Apart from rice, cassava, sweet potatoes and corn are also important components in the diet of Indonesian people. However, rice remains one of the main commodities due to high levels of consumption. Among the provinces in Indonesia, Central Java stands out as one of the largest rice producers. In 2022, Central Java managed to record production of 9,579,069 tons. The success of rice production in Central Java cannot be separated from the contribution of various districts and cities within it. For example, Sukoharjo district is one that achieves the highest production with yields reaching 6.40 tons per hectare. This achievement not only reflects the efficiency of local farmers but also emphasizes their important role in supporting rice production nationally. Thus, rice not only plays a vital role in meeting Indonesia's food needs, but also becomes an integral part of the economy and agriculture at the provincial and district/city levels. Continuous efforts need to be made to improve production and efficiency in rice production to ensure adequate food availability for the Indonesian people.

In 2022, the Indonesian Ministry of Agriculture introduced a new initiative that inspires optimism in the agricultural sector by releasing rice planting pattern development program known as Crop Index (IP) 400. This program aims to spur an increase in agricultural land area and crop yields, which will ultimately strengthening food security, increasing farmers' income, and overcoming the negative impacts of rice land conversion. In an effort to implement this program, the Ministry of Agriculture set Sukoharjo as the main focus. This decision was based on the high rice production in the area, making it a priority area for the development of the Crop Index (IP) 400 program. Sukoharjo was chosen not only because of its satisfactory yields, but also because of its potential to become a pilot model for implementing efficient cropping patterns. and sustainable.

Production of rice farming is hampered by a number of factors, including limited land area, high costs for agricultural production facilities, excessive use of chemical fertilizers and pesticides, and production that is not yet optimal. Sukoharjo District, for example, had an average farmer land ownership of 0.43 (BPS, 2021). In context of technology, farming on limited land often reduces the efficiency of agricultural processes, given the limited space to implement modern technologies and more effective farming practices (Andrias, *et al*. 2017). In addition, land area has an influence on farmers' income. This is in accordance with the opinion of Mamondol (2016), which states that the larger the land area causes the amount of farm income to increase, but consequently the costs incurred by farmers for farm operations are also greater.

Excessive use of chemical fertilizers and pesticides is also an inhibiting factor. Apart from having a negative impact on the environment and health, inappropriate use can reduce soil quality in the long term and reduce soil fertility. Murnita and Yonni (2021) stated that inorganic fertilizers that are used continuously without the addition of organic fertilizers can result in an imbalance of nutrients in the soil, the soil structure becomes damaged, the microbiology in the soil is little. Production that is not yet optimal also reflects management and knowledge problems. Research by Okello confirms that excessive or inefficient use of production materials directly has a negative impact on agricultural production (Okello, 2019). Therefore, it is very important for farmers to comply with the guidelines set by local governments in using chemical fertilizers and pesticides.

Increasing rice production depends on farmers' ability to manage production factors effectively. Managing production factors effectively involves several important aspects. First, selecting superior seeds that have high yield potential and are resistant to pests and diseases. Second, the correct and appropriate use of fertilizers and pesticides, as discussed previously, helps maintain soil fertility and plant health without damaging the environment. Third, efficient water management is very important in rice farming, considering that rice is a plant that requires a lot of water. Fourth, farmers' knowledge and skills in implementing good agricultural practices are also a crucial factor. This research aims to determine the production factors that affect rice farming Crop Index (IP) 400 in Sukoharjo District.

METHODS OF RESEARCH

This research took place in seven different sub-districts in Sukoharjo District, namely Mojolaban, Polokarto, Bendosari, Sukoharjo, Weru, Tawangsari, and Bulu. The locations were chosen purposively to cover a diversity of environmental and socio-economic conditions. In determining the sample, a purposive sampling method was used which considered various factors, including the crop product index (IP) of rice farmers.

A study by Hair et al in 2019 suggested that in regression analysis, the sample size should be at least 15-20 times the number of variables used. They emphasised that this is important to ensure the validity and reliability of the analysis results. In addition, using an appropriate sample size helps to reduce bias and increase the generalisability of research findings. In the context of this research, with five variables considered, a sample size of approximately 90 farmers is required to ensure the accuracy of the analysis. According to these recommendations, a sufficiently large sample size is crucial to ensure adequate representation of the population under study. Therefore, the sample size was chosen carefully to ensure reliable and relevant research results in the context of the regression analysis carried out.

This research uses the Stochastic Frontier Analysis (SFA) method to examine the various factors involved in increasing the production of wet rice farming using the 400 planting index (IP) cropping pattern. In addition, this study also considers environmental variability and management as important elements that can affect production efficiency. The results of this analysis reveal a production function that reflects efficiency as well as factors that have an impact on production in rice farming with IP 400 planting pattern. It is our understanding that the frontier production function of lowland rice farming with a planting index (IP) of 400 is as follows: We propose that the following equation may be a suitable

representation of the frontier production function of lowland rice farming with a Planting Index (IP) 400 planting pattern: $LnY = \beta0 + \beta1lnX1 + \beta2lnX2 + \beta3lnX3 + \beta4lnX4 + \beta5lnX5 + vi - ui$ (1) Y represents rice production (tons/Ha), X1 is the number of land areas (ha), X2 is the amount of rice seeds (kg), X3 is the amount of inorganic fertilizers (kg), X4 is the amount of pesticides (liter), and X5 is the number of labors (HOK).

RESULTS AND DISCUSSION

This research aims to investigate the production efficiency of lowland rice farming with a Crop Index (IP) 400 planting pattern using the Stochastic Frontier Analysis (SFA) method. This method was chosen because of its ability to evaluate technical efficiency and factors that influence the production process in more depth. Stochastic Frontier Analysis (SFA) is a statistical approach used to separate technical efficiency from market imperfections and other external factors in a production system. By using SFA, we can measure how far the technical efficiency of a farm is compared to the "frontier" or maximum level of efficiency that can be achieved. This makes it possible to identify factors influencing production efficiency and provide recommendations for improvement. In the context of this research, the main focus is on lowland rice production with a Cropping Index (IP) 400 planting pattern. This planting pattern has become one of the strategies widely used by farmers to increase production and efficiency in resource use.

Research in lowland rice farming using the Stochastic Frontier Analysis (SFA) approach provides in-depth insight into the factors that influence agricultural production. The study selected 90 farmers as samples to evaluate possible relationships between a number of variables. We also looked at other factors that could influence the results of the analyses, including land area, number of seeds, fertilizer dose, pesticide dose, and number of workers, and production. In addition, we conducted an analysis of water availability and light intensity as potential factors influencing plant production. The SFA approach, used in this research, provides advantages in overcoming market imperfections and external factors that can influence production results. By taking these variables into account, research can evaluate the extent to which these factors influence production and identify areas where production efficiency can be improved.

There were 90 respondents in this study who were purposively selected based on criteria, namely farmers who carry out rice farming with a Planting Index (IP) of 400 in Sukoharjo District and are willing to be interviewed using a questionnaire. The characteristics studied in this study include age, education level, farming experience, cultivated land area, and land ownership. Farmer characteristics have a very important influence on farming changes (Managanta, et al., 2018). The following is the identity of IP 400 rice farmer respondents in Sukoharjo District in 2022.

Table 1 – Identity of IP 400 Rice Farmer Respondents in Sukoharjo District in 2022

No	Farmer Identity	Description
1.	Age	58 years
2.	Education	
	• Elementary School	31 person
	• Junior High School	12 person
	• SMA/SMK	34 person
	• College	13 person
3.	Size of Cultivated Land	0,68 Ha
4.	Rice Farming Experience	23 years
5.	Land Ownership Status	
	• Owned	29 person
	• Rent	30 person
	• Own and Rent	31 person

Source: Primary Data Analysis, 2024.

Based on Table 1, it is known that the average farmers is 58 years old. The productive age of a person is 18-60 years, so rice farmers of IP 400 in Sukoharjo District are farmers

with productive age. Farmers who are in the productive age category will carry out farming activities well because they have a body with a condition that is still fit, have high enthusiasm and motivation, and are still able to think rationally in managing their farms. The level of formal education of rice farmers IP 400 in Sukoharjo District are SMA/SMK. Education will affect mindset so farmers will be open to accepting changes in farming, especially with new innovations and technologies (Soekartawi, 2006). According to Laim, C. and Liska Simamora (2022), in farming activities, level of education will affect the increase in production and efficiency of farming because farmers will be encouraged to adopt technology and agricultural production.

The average land area cultivated by farmers to produce rice with Crop Index (IP) 400 is 0,68 Ha. The area of cultivated land will affect the amount of production, production costs, and income. According to Andrias, et al. (2023), the extensive of cultivated will greater to use of labors in land management. The ownership status of land cultivated on average is both owned and rented land. Owning land will provide benefits, security, and comfort for famers because there are no costs incurred. Land ownership and size of cultivated land are caused by socioeconomic factors, dynamics of urban growth and demographics, and regulations (Morina and Istriningsih, 2020).

The farming experience owned by rice farmers IP 400 in Sukoharjo District is 23 years. The experience of farmers is one of determining factors in success of a farm. Long-term farmers will choose innovations more carefully and selectively, and they will make more thoughtful decisions when making decisions about how to carry out their farming operations. (Agatha and Wulandari, 2018)

Rice production inputs are everything that is needed in the farming process in needed in farming process producing rice. This production input consists of use agricultural production infrastructure and labor. The provision of production input requires the ability of farmers to manage. To obtain maximum production results, farmers need to combine the use of appropriate production inputs. Production inputs in IP 400 rice farming in Sukoharjo District consist of seeds, urea fertilizer, ZA fertilizer, P/NPK fertilizer, KCl fertilizer. The average use of rice production inputs in Sukoharjo District can be seen in Table 2.

Table 2 – Average Production Inputs of IP 400 Rice Farming in Sukoharjo District in 2022

No	Description	Farming Costs for 0,68 Ha	Farming Costs for 1 Ha
1.	Land Area (m^2)	6.800	10.000
2.	Seed (kg)	33	49
3.	Inorganic Fertilizer		
	• Urea (kg)	219	353
	• Phonska (kg)	233	365
	• ZA (kg)	14	20,58
	• KCl (kg)	14,99	21,31
3	Pesticides (liters)	1,6	4
4	Labors (HOK)	58,8	92,35

Source: Primary Data Analysis, 2024.

The results of the stochastic frontier production function (SFA) analysis in the context of rice farming with a crop index (IP) of 400 suggest that there may be some interesting findings to be had. The results of the analysis show that land area (X1), number of seeds (X2), number of fertilizers (X3), number of pesticides (X4) and number of labors (X5) have a significant impact on paddy production. Firstly, it can be observed that land area appears to have a significant impact on production. Furthermore, it seems that increasing the number of seeds may also be strongly correlated with increasing production. The larger the land area used, the higher the production; however, this has limitations that must be considered to ensure optimal land use. Second, the number of seeds also plays an important role in production. Using the right seeds in quantity and quality can increase crop yields significantly. Third, the amount of fertilizer applied also has a significant impact. Proper fertilization can increase soil fertility and crop yields. Fourth, the use of pesticides affects production by controlling pest attacks and plant diseases.

The application of more modern agricultural technology and practices can help optimize the use of labor. Estimation results from the stochastic production function *Frontier Analysis* (SFA) rice farming with a Crop Index (IP) 400 planting pattern are as follows.

Table 3 – Results of Stochastic Frontier Analysis (SFA) parameter estimation for rice farming using the Maximum Likelihood Estimation (MLE) approach

Variable	Coefficient	Standard Error	T-count
Intercept	2.1033	0.3048	6.8987
Land Area (Ha)	4.1603***	0.4992	8.3334
Seeds (kg)	0.0101	0.0095	1.0633
Fertilizer (kg)	0.0016	0.0014	1,1893
Pesticides (lt)	0.0039***	0.0005	6.9965
Labor (HOK)	0.0692*	0.0351	1.9689
Sigma Square (σ)	7.4425		3.0710
Gamma (γ)	0.7140		5.8836
Log likelihood function			-0.0001
LR test of the one-sided error			11.2074

*Note: We would like to bring your attention to the following results, which we believe are worthy of your consideration. *** is significant at the α level of 0.01; ** is significant at the α level of 0.05; * is significant at the α level of 0.10.*

From the results of the evaluation carried out, it was found that the value (γ) was 0.7140, indicating that around 71.4% of the gap between actual and minimum production was caused by technical inefficiency factors. This indicates that there is great potential to increase technical efficiency in lowland rice production with a Cropping Index (IP) 400 planting pattern. The remaining 28.6% of the gap is influenced by external factors such as climate conditions, pest attacks and plant diseases, as well as modeling errors that cannot be avoided by farmers. These results highlight the importance of identifying and addressing technical inefficiency factors to improve overall production. Through analysis using the Maximum Likelihood Estimation (MLE) method, it can be observed that all parameters in the rice production function have positive values, in line with expectations. Estimation of these parameters provides valuable insight into the elasticity of inputs used in the production process. Input variables that have a significant impact on rice production include land area, pesticide use, and labor. This shows that efficient management of land area, appropriate use of pesticides, and increasing labor effectiveness can significantly increase crop yields.

Considering a cropping pattern with an IP 400, the results suggest that the use of seed and fertiliser may not have a significant impact on rice production. The results also show that other variables, such as irrigation practices and pest control, may also affect yields. This may be surprising, considering the importance of quality seeds and appropriate fertilizer in increasing crop production. The use of N fertilizer or urea and other fertilizers has no effect on production due to the history of land that has been used intensively without any land rehabilitation (Ahmad, *et al*., 2015). These results suggest that in the context of certain cropping patterns, such as IP 400, other factors may have a more dominant influence in determining rice production. The implication of this finding is the importance of adjusting farm management strategies according to the specific characteristics of the cropping pattern used.

The land elasticity coefficient of 4.160 is a significant finding in this analysis, indicating a large impact on rice production at the 99% confidence level. This means that increasing land area has great potential to substantially increase rice yields, even when other factors remain stable. This finding is consistent with previous research by Dait (2023), Zulkarnain (2022), Moonik (2020), and Rika (2019), Previous research has shown that there is a significant positive effect of land area on rice yield. These studies have also highlighted the importance of effective land management to increase rice production, which suggests that land size may play an important role in increasing rice paddy production. This confirms that in the context of rice farming, land area plays a key role in determining crop yields. Apart from land area, the soil variable also stands out as a very sensitive factor in this analysis, characterized by the largest elasticity coefficient among other variables. This shows that soil characteristics, such as quality and texture, have a significant influence on agricultural

production. In the context of this research, the land area used ranges from 0.1 to 4 hectares, with an average of 0.7 hectares. However, it should be noted that land area has a greater impact than other variables on rice production in Sukoharjo District.

Therefore, the strategy to increase rice production in this region can be focused on land intensification by implementing a Crop Index (IP) 400 planting pattern. In this way, not only will the land area be increased, but also more intensive management can optimize crop yields. This is in accordance with the characteristics and conditions of the land in the area, and shows that increased production can be achieved through a combination of increasing land area and increasing management efficiency. Implementing the IP 400 planting pattern can be an effective strategy because it allows optimal land use by paying attention to factors such as plant density, fertilization, and pest and disease control. Apart from that, this approach also considers economic and environmental aspects, thereby providing a sustainable solution in the long term. In conclusion, the results of this analysis offer a more nuanced understanding of the role of land area and soil variables in influencing rice farming production. In conclusion, the findings from this analysis offer a more nuanced understanding of the role of land and soil properties in determining rice farming production. By focusing on land intensification and implementing appropriate cropping patterns, farmers can increase their crop yields significantly. This is not only economically beneficial for farmers,but also has the potential to increase food availability in the region as a whole.

Variations in the elasticity coefficient of pesticides show a significant impact on rice production, with a 99% confidence level at $\alpha = 0.01$, which has a value of 0.004. The results of this study provide an important understanding of the possible effects of pesticide use on rice production. In addition, this study provided an in-depth examination of the variables that can affect rice production in relation to pesticide use. The study found that a 1% increase in pesticide dosage has the potential to increase yield by 0.004%, other things being equal. In addition to these findings, the study also found that excessive use of pesticides can have a negative impact on soil quality, so a balanced approach to their use is needed. This finding is consistent with previous findings by Zulkarnain and his team (2022), as well as previous research such as the work of C. Nurul et al. (2018) and Adedoyin (2016), It was suggested that pesticide use could have an impact on rice production. This suggests that the use of pesticides may be an important factor in maintaining agricultural production, especially in the face of threats from pests and plant diseases.

However, field observations show that pesticide use practices in this region do not always follow the guidelines recommended by producers or local agricultural extension workers. Many farmers tend to use pesticides when their crops are attacked by pests or diseases without considering the correct dosage or recommendations given. This state of affairs indicates that there is a mismatch between scientific theory and practical application of pesticides in the agricultural sector. It also highlights the need for a more integrative approach to bridge theoretical understanding and real-world practice to improve the effectiveness and safety of pesticide use. Therefore, further efforts are needed to increase farmers' awareness of the importance of appropriate pesticide doses in order to maximize rice yields efficiently and sustainably.

Education and training on the wise and effective use of pesticides should be a priority for governments, agricultural research institutions and farmer organizations. This can be done through direct counseling, field training, and providing easily accessible educational materials. Apart from that, the importance of developing environmentally friendly agricultural technology and practices must also be considered. The overuse of pesticides can have a detrimental impact on the environment and human health. Furthermore, pesticides can contaminate soil and water, and harm non-target organisms such as beneficial insects and wild animals. Therefore, farmers need to be provided with more sustainable alternatives, such as using plant varieties that are resistant to pests and diseases, using organic control methods, and integrated agricultural practices.

It seems that the number of different workers may have a significant impact on paddy production, with a coefficient of 0.069 at a significance level of $\alpha = 0.05$. A 1% increase in labour can be attributed to a 0.069% increase in rice production. Furthermore, the utilisation

of more sophisticated agricultural technology and superior cultivation techniques can also exert a considerable influence on yields. This suggests that the number of workers plays an important role in increasing rice paddy production. These findings consistently support the results of previous research by Mudaffar (2023), Zulkarnein (2022), Haryanto (2021), and C. Nurul (2018), which also shows that labor variables influence rice production. Labor is a key element in rice farming, involved in all aspects of activities from planting to harvest. However, at this research location, it was found that labor availability was limited. The majority of available workers are elderly and women. Young workers tend to be more interested in jobs in the industrial sector in urban areas rather than joining rice farming. This condition causes a minimum workforce available for agriculture, which in turn affects production. To overcome these limitations, farmers need to look for innovative strategies. One approach is to manage labor use more efficiently.

CONCLUSION

The findings indicate that there may be a positive and significant influence of land area, pesticide use, and labour on rice paddy production. It would appear that land area is the most influential input factor on rice paddy production. Furthermore, it is worth noting that rainfall variables can also have a significant impact on rice paddy production. This shows the importance of efficient land management in increasing crop yields. By expanding the rice planting area, farmers can increase their production potential significantly. The use of pesticides also makes a significant contribution to rice production. Proper use of pesticides can help control pest attacks and plant diseases, which can reduce crop yield losses. It is of the utmost importance that those engaged in agricultural practices adhere to the recommended pesticide application rates and adopt sustainable practices in order to prevent any adverse effects on the ecosystem and public health. Moreover, the integration of organic methods and the monitoring of pesticide residues can enhance environmental safety and human well-being. Apart from that, labor also has an important role in rice production. However, in the area studied, the availability of productive labor in the agricultural sector is limited.

REFERENCES

1. Adedoyin, A. et al. 2016. Resource-Use and Allocative Efficiency of Paddy Rice Production in Mada, Malaysia. Journal of Economic and Sustainable Development Vol. 7, no. 1: 49 – 55.
2. Agatha, M. K. and Eliana Wulandari. 2018. Analysis of Factors Affecting Potato Production in Farmer Groups of Sawargi Partners in Barusari Village, Pasirwangi Sub-District, Garut District. Agroinfo Galuh Student Scientific Journal Volume 4 Number 3(2018).
3. Agriculture and Fisheries Service of Sukoharjo District. 2021. Land Use by Subdistrict in Sukoharjo District in 2021 (Internet). Downloaded 2024 May 15. Available at Luas Penggunaan Lahan menurut Kecamatan di Kabupaten Sukoharjo Tahun 2021 - 2021 - Opendata Kabupaten Sukoharjo (sukoharjokab.go.id).
4. Andrias, A. A., et al. 2016. The Effect of Land Area on Production and Income of Rice Paddy Farming (A Case in Jelat Village, Baregbed District, Ciamis District). Agroinfo Galuh Student Scientific Journal Volume 4 Number 1, September 2017.
5. BPS. 2023. Harvested Area and Rice Production in Indonesia 2022. Jakarta: Central Statistics Agency.
6. Dait, Jennifer. 2023. A Panel Data Study on Factors Affecting Rice Production in the Philippines. Universal Journal of Agricultural Research 11(3): 547 - 557, 2023. http://doi.org/10.13189/ujar.2023.110305.
7. Hair, Joseph F. et al. 2019. Multivariate Data Analysis. China: Cengage Learning EMEA

8. Harini, Rika., et al. 2019. Analysis of Agricultural Land Area on Rice Production in North Kalimantan. Kawistawa Journal Vol. 9, No. 1, April 22, 2019: 15-27. https://doi.org/10.22146/kawistara.38755.
9. Haryanto, Asep. et al. 2021. The Effect of Capital, Land Area, and Labor on Rice Farming Income (Oryza savita L) Mekongga Cultivar. OrchidAgri Vol.1, No. 1, February 2021. http://dx.doi.org/10.35138/orchidagri.v1.i1.244.
10. Laim, C. O. R. & Liska Simamora. 2022. An Analysis of Factors That Affects Rice Field Farming Productivity and Feasibility. Mimbar Agribisnis: Journal of Agribusiness-minded Scientific Society Thought. January 2022. 8(1): 75-88.
11. Mamondol, M. R. 2016. The Effect of Land Area on Revenue, Production Costs, and Income of Rice Paddy Farming in Toinasa Village, West Pamona District. Envira Journal Volume 1 Number 2 December 2016.
12. Ministry of Agriculture. 2022. Food Consumption Bulletin.
13. Moonik, Friska., et al. 2020. Analysis of Factors Affecting Rice Farming Production in Tumani Village, Mesaan District. Agri-Socioeconomics Unisrat Volume 16 Number 1, January 2020: 69 – 76.
14. Mudaffar, R. Azizah. 2023. Analysis of Allocative Efficiency of Production Inputs in Rice Farming in Harapan Village, Walenrang District. Perbal: Journal of Sustainable Agriculture, Vol. 11, No. 2 July 2023.
15. Murnita and Yonni A. T. 2021. The Impact of Organic and Inorganic Fertilizers on Changes in Soil Chemical Properties and Rice Plant Production (Oryza sativa L.). MENARA Ilmu LPPM UMSB Vol. XV No. 2 January 2021.
16. Nurul, V. et al. 2018. Analysis of Allocative Efficiency of the Use of Factors of Production on Rice Farming (Oryza sativa L.) (Case Study in Puhjarak Village, Plemahan District, Kediri District). Journal of Agricultural Economics dan Agribusiness (JEPA) Vol. 2, No. 1 (2018): 10 -18.
17. Okello, David. et al. 2019. Farm Level Allocative Efficiency of Rice Production in Gulu and Amuru District Nothern Uganda. Agricultural and Food Economics (2019) 7: 19. https://doi.org/10.1186/s40100-019-0140-x.
18. Pasaribu, M. and Istriningsih. 2020. The Effect of Land Tenure Status on The Income of Smallholder Farmers in Indramayu and Purwakarta District. Journal of Agricultural Technology Assessment and Development 23(2):187-198.
19. Soekartawi. 2006. Farm Analysis. UI Press. Jakarta.
20. Zulkarnain. et al. 2022. Efficiency, Allocative, and Economic Analysis of Rice Paddy Farming. Economic and Public Policy Studies (SEKP) Vol. 1, No. 1, 2022.