

Identification Of Key Factors For Boosting To Increase Rice Production: Case Study In Merauke Regency, South Papua Province, Indonesia

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ABSTRACT

Kurik District is one of the rice centers in Merauke Regency, South Papua Province. From 2019 to 2023, the . If allowed to continue, it will result in food shortages. Therefore, it is necessary to identify factors that can increase rice production. This study aims to determine the factors that affect rice production and to determine the factors that have a dominant influence on rice production. This research was conducted in Kurik District, Merauke Regency, from June to August 2023. The types of data used are primary data and secondary data. Primary data was obtained from interviews, questionnaires, and observations. Secondary data is obtained from B.P.S. and other literature. The number of samples in this study was 473 rice farmers in Kurik District, Merauke Regency. Factors affecting rice production in Kurik District of Merauke Regency are land variables (0.312), seed variables (0.179), fertilizer variables (-0.143), and labor variables (0.290), while the dominant factor affecting rice production in Kurik District of Merauke Regency is the land variable (0.312). In this study, the factors that influence rice production have low values. Therefore, it is necessary to research to find other variables that significantly influence rice production in Kurik District, Merauke Regency.

Keywords: *production factors, Rice Fields, Rice production, Influence,*

BACKGROUND

Indonesia is an agricultural country, where most of the population has a livelihood as farmer (Zaeroni & Rustariyuni, 2016), Syaputri et al., 2024), So that the agricultural sector is a sector that has a vital role in the economy (Djunedi, 2016, Cheraghalipour et al., 2019, Rahayu & Febriaty, 2019), household food security (Lanamana & Fatima, 2022). Rice is a strategic commodity (Arouna et al., 2020) (Palobo, 2019) and has high economic value (Silitonga, 2017), staple food items (N. Van Nguyen & Ferrero, 2006), H. M. Nguyen et al., 2021, Zhang et al., 2020, Defidelwina et al., 2019,

Ghosh et al., 2018), 90% Rice is grown in Asian countries (Shafie et al., 2014), the staple food of most people in Indonesia (Hernawan & Meylani, 2016) Sriatmoko et al., 2019, Marlina et al., 2017). Even people in the Land of Papua are now experiencing a process where their staple food is sago, tubers, now slowly being replaced by rice (Afriansyah & Indra Irjani Dewijanti, 2020).

Merauke, one of the regencies in the Province of South Papua, has extensive and flat land that is very suitable for use as an agricultural area. Merauke Regency has a superior commodity, rice, with rice centers in Kurik, Tanah Miring, Semangga, and Malind Districts (Widyantari & Maulany, 2020). Rice farming has not developed efficiently for both transmigrant and local farmers. This inefficiency is mainly due to managerial factors, namely in applying fertilizers, pesticides, and seeds, and a small part due to factors humans cannot control, such as pest attacks and erratic climate (Widyantari et al., 2018, 2019, Widyantari, Loppies, et al., 2023). However, economically, farming in Merauke Regency is feasible because it has a feasibility value greater than one (Widyantari, Maulany, Wijayanti, et al., 2022), Syah et al., 2024, Sutarman et al., 2024) and is also not yet prosperous (Astaurina et al., 2024). Farmers have used mechanization in cultivating land, so many have established a viable four-wheel tractor service business (Fernanda et al., 2024). The rice milling agro-industry is efficient due to the large rice production and the small number of mills (Widyantari et al., 2020), the efficient marketing of rice in the internal environment, and the smooth distribution pattern of the rice supply chain of product flow, money flow, and information flow (Widyantari, Jamhari, et al., 2023).

The rice planting area in Merauke Regency fluctuates. In 2020, the rice planting area decreased by 2%; in 2021, it increased by 6%; in 2022, it decreased by 9%. The fluctuating rice planting area also impacts the rice production in Merauke Regency. In 2020, it decreased by 13%, then in 2021, it increased by 23%, and in 2022, it decreased by 22%. This resulted in rice productivity in Merauke Regency also experiencing fluctuations. In 2020, rice productivity decreased by 11%; in 2021, it increased by 16%, and in 2023, it decreased again by 14% (BPS Provinsi Papua, 2020) (BPS Provinsi Papua, 2021), (BPS Provinsi Papua, 2022), (Badan Pusat Statistik Provinsi Papua, 2023).

Meanwhile, the population growth rate in Merauke Regency has increased; in 2020, it increased by 1.55%; in 2021, it increased by 0.33%; and in 2022, it increased by 0.28% (BPS Provinsi Papua, 2021), (BPS Provinsi Papua, 2022), (Badan Pusat Statistik Provinsi Papua, 2023).

Seeing population growth in Merauke Regency, which continues to grow or increase from 2019-2023 while rice production fluctuates and tends to decline, if this is allowed to continue, it can experience food shortages. Therefore, it is necessary to research the factors that affect rice production in Kurik District, Merauke Regency. Policies can be made to encourage increased rice production by knowing the factors that affect rice production. Thus, the problem of rice shortage can be avoided.

Research like this has been conducted by Randika et al. (2021) in Sepang Village, Pampangan Regency. The purpose of the study was to determine the factors that influence the production of paddy rice, with the number of respondents 91 farmers. The independent variables studied were labor, land area, seed use, urea fertilizer, insecticide, and the dependent variable production. The analytical tool used was multiple linear regression. The novelty of this research compared to previous research is that the previous research was conducted in one village. In contrast, this research was conducted in 11 villages, namely Anumbob Village, Jaya Makmur, Candra Jaya, Harapan Makmur, Kurik Salor Indah, Wonorejo, Sumber Mulya, Sumber Rejeki, Telaga Sari, Wapeko, Kurik District, Merauke Regency in 2023. The purpose of the previous study was only to look for influential factors, while this study added the dominant factors that influence. The previous study did not use the independent

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variable of seed, while this study used the independent variable of seed. The sample used previously was only 91 farmers, while this study used a sample of 473 farmers; the analytical tool used in previous studies was SPSS, while this study used the Smart PLS 3.0 analytical tool. This study aims to determine the factors that affect rice production and to determine the factors that have a dominant influence on rice production, with the formulation of the problem What factors have an influence on rice production in Kurik District, Merauke Regency

RESEARCH METHODS

This descriptive-analytical research examines current problems that are facts/phenomena. The research location is Kurik District, Merauke Regency, South Papua Province. The method of determining the location is done using a purposive method specific criteria, namely, As the largest rice-producing area in Merauke (Widyantari & Maulany, 2020). This research was conducted for three months, namely July-September 2023. The population in this study were all farmers who grow rice in Kurik District, totaling 3578 farmers. The sampling technique was carried out with a sampling quota with a sample of 473 farmers, consisting of 11 villages, namely Kampung Anumbob (49), Jaya Makmur (17), Candra Jaya (66), Harapan Makmur (6), Kurik (54), Salor Indah (49), Wonorejo (32), Sumber Mulya (80), Sumber Rejeki (28), Telaga Sari (87), Wapeko (5). The selection of farmer samples was carried out using a propotional random sampling technique. The primary and secondary data used in this study are primary and secondary data. Primary data is research data obtained directly through surveys, observations, and interviews with related parties. The secondary data used in this study are data obtained from BPS Merauke, data from Kurik District, literature, and the internet. This research instrument is measured using a Likert scale 1-5 scale with statements strongly disagree (STS) value 1, disagree (TS) value 2, neutral (N) value 3, agree (S) value 4, and strongly agree (SS) value 5. Table 1. shows the instruments used in this study.

Table 1. Research Instruments

Variables	Statement
Land	Planting area affects income
	The larger the land area, the greater the income
	Land area affects the amount of maintenance costs
	Laborers' wages are determined by land area
	Land area affects the amount of production costs.
Labor	During the planting season use labour from outside the family
	Non-family labour is easily available
	The labour force used is a skilled workforce
	The amount of pay is commensurate with the work done
Fertiliser	Type of fertilizer used as recommended by the government
	Fertilizer prices are relatively affordable
	Fertilization is done at least twice
	Fertilization is done evenly
	Fertilizer is easily available
Seeds	The seeds used are superior/certified seeds
	The number of seeds used per hectare is as recommended
	Rice seed varieties are always changing per growing season.
	The seeds used are pest resistant
	The seeds used are resistant to plant disease attacks

Variables	Statement
Production	The amount of rice produced per hectare is more than 70 sacks
	The quality of the rice produced is good
	The selling price of the product is high
	The products produced can meet daily needs
	The amount of income received is greater than the costs incurred

Source: Primary Data Processed, 2023.

The data was analyzed using the Partial Least Square (PLS) method using Smartpls software version 4.0. SmartPLS is a statistical modeling technique used to analyze the relationships between latent variables in both structural and measurement models. SmartPLS is chosen because it can flexibly analyze relationships among latent variables, especially when the data is non-normal, the sample size is limited, and the research model is complex.. Data analysis was carried out as follows:

Measurement Model or Outer Model

Validity Test

The validity test is carried out to determine whether a questionnaire is valid. The questionnaire is valid if it can reveal what will be measured. The validity test was carried out on all question items on the variable. Variable items are valid if they have an analysis result value ≥ 0.7 . The validity testing stage includes convergent validity, average variance extracted (AVE), and discriminant validity tests (Nurhalizah et al., 2024).

Reliability Test

The reliability test was carried out to assess the reliability of the statement items in the variable and to measure the consistency of respondents in answering question items. The reliability test uses composite reliability; a variable with a composite reliability value ≥ 0.7 can be considered reliable (Nurhalizah et al., 2024).

Structural Model or Inner Model

The inner model (inner relation, structural model, and substantive theory) is used to analyze the relationship between independent variables. The structural model is evaluated using R-square for the dependent variable, the Stone-Geisser Q-square test for predictive relevance, and the t-test and the significance of the structural path parameter coefficients. The PLs model is carried out by looking at the R Square value on each independent variable. This R Square value is used to see whether the independent variable influences the dependent variable (Nurhalizah et al., 2024).

Hypothesis test

When testing the inner model, hypothesis testing on smartpls is made by looking at the analysis value on the Path Coefisien. The hypothesis is accepted if the t statistic value is greater than the t table value (α 5%); if the t statistic value in the hypothesis is greater than the t table, then it is accepted.

RESULT AND DISCUSSION

Characteristics Respondens

Here is an overview of the characteristics of rice farmers in Kurik District:

Table 2. Characteristics of Rice Farmers in Kurik District, Merauke Regency

Description	Mean	Max	Min	Deviation Standard
Age	46,27	85	17	11,30
Education	9	16	0	2,715999
Experience	19,7	62	2	10,52897
Family Dependents	3	8	0	1,118787

Source: Processed primary data, 2023

The average age of rice farmers in Kurik District of Merauke Regency is 46 years. This means that rice farmers in the Kurik District of Merauke Regency are still in the productive age category. The productive age of a worker is in the range of 18-60 years. Age will affect efficiency, so farmers who do farming at a productive age will provide better results than those who have a non-productive age (Machmuddin, 2016). Therefore, farming in Kurik District should yield better results as it is in a productive age.

The average education of farmers in Kurik District is junior high school education, and the most dominant is elementary school education. This means that the education level of farmers in Kurik District still needs to be higher. According to Mutiarasari (2017), the higher a person's education, the better the ability to adopt technology and innovate. The low education level of farmers in Kurik District will make it difficult for them to adopt new technologies and innovations. Therefore, it is necessary to conduct training and extension programs for rice farmers.

The minimum experience is 2 years, and the maximum experience is 62 years. The longer the experience of farmers, the more it will affect the way farmers solve various problems in rice farming, but the higher the experience of farmers, the older the age of farmers, the decreasing physical ability of farmers to work (Mahananto, Sutrisno, S., & Ananda, 2009). The average experience of farmers in Kurik District is 19.7 years, which means that farmers have a long experience, and therefore, they have experience facing problems in farming.

The average number of family dependents of rice farmers in Kurik District of Merauke Regency is three person. The number of family dependents at a productive age will affect the farming they are engaged in. This is because the habit of communities in rural areas is to involve family labor in their farms. Farmers in Kurik District always involve family labor, both wives and children. If we look at the average age of farmers, which is 46 years old, it means that the age of farmers' children is already at a productive age so that they can help their parents in the rice fields.

Validity and Reliability Test Results

The validity test measures whether a questionnaire is valid or not. For the validity test, it is said to be valid if the loading factor is (λ) ≥ 0.7 . Loading value above 0.7 except P3 Production. P3 Production is still maintained to have a value above 0.6 as long as Ave is above 0.5. It can still be said to be valid (Dzin & Lay, 2021).

Researchers conducted a discriminant validity test by analyzing the Average Variance Extracted (AVE) value; this test is to determine whether variables are convergently valid, discarded, or retained. (Hussain et al., 2018). Meanwhile, according to (Sihombing & Arsani, 2022), if $AVE > 0.5$, then it is considered valid. Based on the AVE value obtained, further tests are carried out by conducting a composite reliability test. The variable is declared reliable if the composite reliability value is above 0.7.

Composite reliability value > 0.70 . According to (Sihombing & Arsani, 2022), constructs are declared reliable if they have a composite reliability value above 0.70. These results state that this model has met the criteria for reliability. After the model is considered valid and reliable, testing the inner model or evaluating the final model formed (structural model) is necessary. Multicollinearity test results show that the seed variable (B1, B2, B3), the land variable (L1, L2, L3), the production variable (P3, P4, P5), the fertilizer variable (PK3, PK4), and the labor variable (TK1, TK2, TK3) obtained V.I.F. values < 10 . The result indicates that the independent variables do not have multicollinearity symptoms.

Testing in this study was assisted by using the Smart P.L.S. version 4 program. The running process uses two stages, namely P.L.S. Algorithm and Bootstrapping. P.L.S. Algorithm serves to display the research instrument test, which is displayed on the output of Factor Loading, AVE, Composite Reliability, Fornell Larcker Criterion, and Cross Loading. At the same time, P.L.S. Bootstrapping displays multiple regression tests by displaying the output of t and the coefficient value of each variable. Figure 1 shows the output results of the coefficient values on the regression model after the data running process.

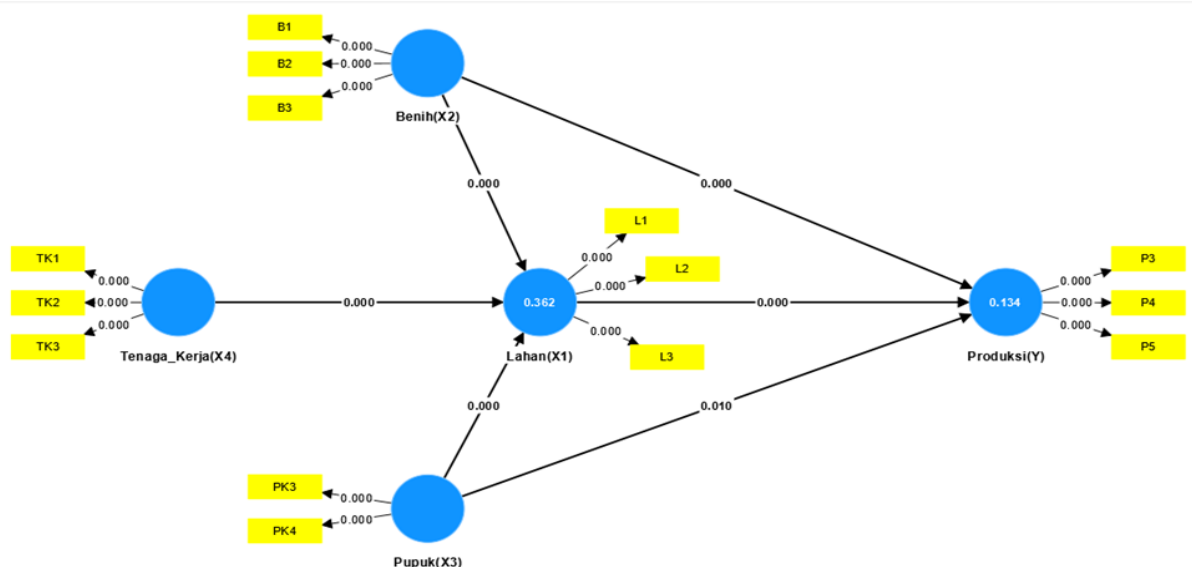


Figure 1. Path Model
Source: Primary Data Processed, 2023

Path Coefficient Test.

The following is an explanation of the results of the pat analysis:

Table 3. Path Coefficient Test

Aspects assessed	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values	Description
Seeds (X2) -> Land (X1)	0.179	0.182	0.050	3.541	0.000	influential
Seeds (X2) -> Production(Y)	0.197	0.202	0.054	3.676	0.000	influential
Land (X1) -> Production(Y)	0.290	0.291	0.045	6.414	0.000	influential
Fertiliser(X3) -> Land(X1)	0.312	0.312	0.045	6.922	0.000	influential
Fertiliser(X3) -> Production(Y)	-0.143	-0.145	0.055	2.586	0.010	influential
Labor(X4)-> Land(X1)	0.273	0.273	0.050	5.503	0.000	influential

Source: Processed primary data, 2023

Table 3 shows that two exogenous variables are positive with a p-value < 0.05 , which means a positive and significant effect on rice production, and one exogenous variable is negative, which means a negative and significant effect on rice production. The seed variable in Kurik District, Merauke Regency, has a significant positive direct effect on rice production with a path coefficient value of 0.197, which means that if the number of seeds is increased by one unit, rice production will increase by 0.197 units. The land variable in the Kurik district of Merauke Regency has a significant positive direct effect on rice production with a path coefficient value of 0.290; this means that if the land area is increased by one unit, rice production will be increased by 0.290 units.

The variable Fertiliser (X3) has a negative and significant effect on Production (Y), with a path coefficient of -0.143, a t-value of 2.586 (> 1.96), and a p-value of 0.010 (< 0.05). Although the direction of the effect is negative, the relationship is statistically significant, and therefore considered influential in the model. The negative sign indicates a negative effect: the higher the use of fertilizer, the more production tends to decrease. The use of fertilizer has a limit, so if the use of fertilizer exceeds the rules, it will hurt plants. Excessive chemical fertilizers can cause wastage and soil damage (Ratriyanto et al., 2019).

Table 3 shows that the indirect effect of seeds through land with a path coefficient value of 0.179 is positive and significant. This result means that every increase of one seed unit requires an additional land area of 0.179. Seeds affect the quality of production. Farmers who use superior and branded seeds will have different production results from those who use improvised seeds. Rice farmers in Merauke Regency generally use seeds used in the previous planting season (Widyantari, Maulany, & Wijayanti, 2022).

The second indirect effect is from fertilizer through the land with a path coefficient value of 0.312, which is positive and significant. This result means that every one-unit increase in fertilizer

requires an additional land area of 0.312 units. One of the factors that influence the increase in rice production is the use of fertilizer (Randika et al., 2021).

The third indirect effect of labor through the land, with a path coefficient value of 0.273, is positive and significant. This means that every increase of one labor unit requires an additional land area of 0.273 units. Labor is used in farming for seed distribution, fertilization, spraying pesticides/herbicides, and plant maintenance. Tillage in Merauke Regency already uses a tractor, and harvesting uses a combine harvester. The use of machines is not only to prevent crop shrinkage but also to overcome labor shortages (Durroh, 2020).

The research Randika et al., (2021) shows that the variables influencing rice production are labor, land area, seed use, urea fertilizer use, and insecticide use. These results indicate that human labor and agricultural inputs such as seeds, fertilizers, and insecticides significantly increase rice production. The research Widyantari et al., (2019) shows that pesticides, seeds, fertilizers, and labor influence rice production. This study differs slightly from Randika's findings but emphasizes that the production inputs of seeds, fertilizers, pesticides, and labor are the main factors determining rice production.

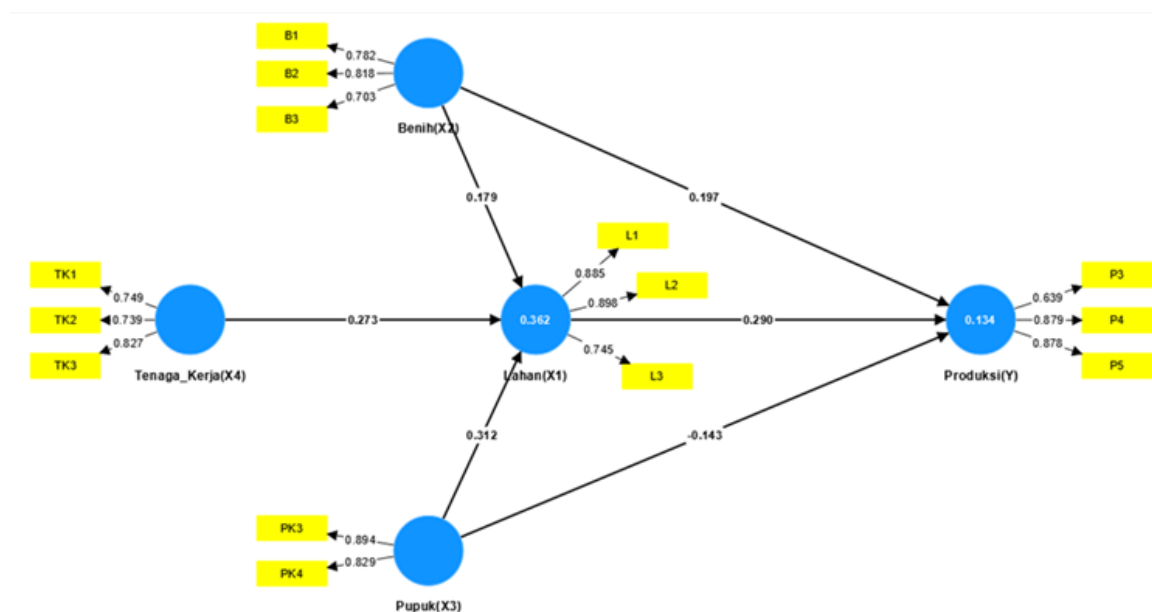


Figure 2. Results of Path Analysis of Rice Production Factors in Kurik District Merauke Regency

Source: Primary Data Processed, 2023

Structural Model Testing

Structural model testing is used to test whether there is an influence between constructs and R square. The structural model is evaluated using the p-value to determine the significance of the structural path parameter coefficient and R Square to determine the effect of the independent latent variable on the dependent latent variable and whether it has a substantive effect.

Coefficient of Determination (R Square)

The coefficient of determination is a number that shows the contribution of the influence given by exogenous latent variables on endogenous latent variables. Based on the test results using SmartPLS 4.0 software, the following results at Table 8.

Tabel 4. Uji R Square

Aspects assessed	R-square	R-square adjusted
Land(X1)	0.362	0.358
Production(Y)	0.134	0.129

Source: Primary Data Processed, 2023

The R Square value obtained for production is 0.129 or 12.9%. This result indicates that the factors of seed, land, fertilizer, and labor affect production by 12.9%, while as much as (1-R Square) 87.1% of the rest is the influence given by other factors not studied. Meanwhile, the R Square of land is 0.358 or 35.8%. Thus, the R Square value is considered low, because the land indicator (X) affects the production indicator by 35.8%, and the rest is influenced by other factors not in this study. Other factors, such as climate and weather, agricultural technology, pest and disease management, soil type and quality, farmer expertise and experience, and many others that have not been discussed in this research, influence rice production. Therefore, these factors can be added to future research. Future research can include other variables that influence rice production.

This result shows that other factors that still need to be considered in this study affect rice production. Therefore, further research is needed to determine these other factors.

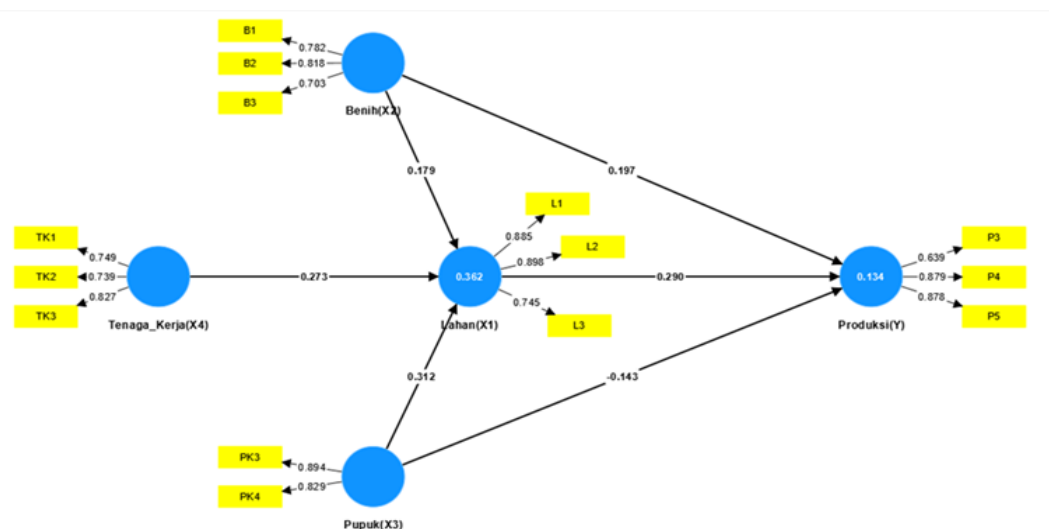


Figure 3. Results of Path Analysis of Rice Production Factors in Kurik District Merauke Regency

Source: Primary Data Processed, 2023

The current research results show that land directly influences rice production, fertilizers and seeds have direct and indirect influences, and labor also indirectly influences rice production. Land directly influences rice production as it is the leading site of plant growth. Fertilizers and seeds have

direct and indirect effects as they increase yields directly and interact with other factors such as labor and land management. Labour has an indirect influence, as the role of labor is more in optimizing the use of other inputs than as the main factor that determines production directly

The main difference between the current and previous research results is in the factors of seeds and fertilizers, which have direct and indirect influences, and labor, which indirectly influences production. The current research results found that seeds and fertilizers can be the main factors or supporting factors, while labor is only a supporting factor that influences other factors. In addition, Randika highlighted the role of insecticides in rice production, but the current research did not highlight this.

The differences in the results between the current and previous research can be caused by several factors, such as differences in the analytical tools used, different locations and regional conditions, and differences in how variables are measured. Therefore, this research provides a new perspective on the direct and indirect influences on production and can serve as a basis for implementing more effective agricultural policies to increase rice production.

CONCLUSION AND SUGGESTION

Conclusion

Factors affecting rice production in Kurik District of Merauke Regency are land variables, seed variables, fertilizer variables, and labor variables. The dominant factor affecting rice production in Kurik District, Merauke Regency, is the land variable. In this study, the factors that influence rice production have low values

Suggestion

- a. Support is needed from the local government and related institutions to provide training for farmers that includes 1) Optimisation of land use through the application of more modern agricultural technology, such as the use of efficient tillage tools and the application of appropriate cropping systems. 2) Correct dosage and timing of fertilizer application should be encouraged, and organic fertilizer should be encouraged to improve soil fertility. 3) Improving their skills so that they are able to maximize production yields with more efficient time and labor.
- b. The government and related institutions are expected to provide high-quality seeds suitable for the agro-climatic conditions in Kurik District.
- c. Future research can add other variables that have not been included in this study, which may have a significant influence on rice production.

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REFERENCES

- Afriansyah, & Indra Irjani Dewijanti. (2020). Persepsi Masyarakat Terhadap Perubahan Pola Konsumsi Pangan Lokal Ke Pangan Beras di Papua Barat. *Jurnal Berbasis Sosial (JBS)*, 1(2), 1–10. <https://jurnal.stkipalmaksum.ac.id/index.php/j>
- Arouna, A., Soullier, G., Mendez del Villar, P., & Demont, M. (2020). Policy Options for Mitigating Impacts of COVID-19 on Domestic Rice Value Chains and Food Security in West Africa. *Global Food Security*, 26, 1–5. <https://doi.org/10.1016/j.gfs.2020.100405>
- Astaurina, E., Widyantari, I. N., & Situmorang, F. C. (2024). Keadaan Sosial Ekonomi Dan Tingkat Kesejahteraan Petani Padi Orang Asli Papua (OAP) Di Distrik Kurik Kabupaten Merauke. *Musamus Journal of Agribusiness*, 7(1), 17–24. <https://doi.org/10.35724/mujagri.v7i1.5944>
- Badan Pusat Statistik Provinsi Papua. (2023). *Papua Dalam Angka 2023*. BPS Provinsi Papua. hBPS Provinsi Papua. (2021). *Provinsi Papua Dalam Angka*.
- BPS Provinsi Papua. (2022). *Provinsi Papua Dalam Angka*.
- BPS Provinsi Papua. (2020). *Provinsi Papua Dalam Angka*.
- Cheraghali pour, A., Paydar, M. M., & Hajiaghahi-Keshteli, M. (2019). Designing and Solving a bi-level Model for Rice Supply Chain Using the Evolutionary Algorithms. *Computers and Electronics in Agriculture*, 162(May), 651–668. <https://doi.org/10.1016/j.compag.2019.04.041>
- Defidelwina, D., Jamhari, J., Waluyati, L. R., & Widodo, S. (2019). The Impact of Migration on Rice Farming Technical Efficiency in Indonesia. *International Journal of Mechanical Engineering and Technology (IJMET)*, 10(03), 1703–1712. <http://www.iaeme.com/IJMET/index.asp1703><http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=10&IType=3><http://www.iaeme.com/IJMET/index.asp1704>
- Djunedi, P. (2016). Analisis Asuransi Pertanian di Indonesia : Konsep, Tantangan dan Prospek. *Jurnal Borneo Administrator*, 12(1), 9–27. <https://doi.org/10.24258/jba.v12i1.209>
- Durroh, B. (2020). Efektivitas Penggunaan Mesin Panen (Combine Harvester) pada Pemanenan Padi Di Kabupaten Bojonegoro. *SINTA Journal (Science, Technology, and Agricultural)*, 1(1), 7–13. <https://doi.org/10.37638/sinta.1.1.7-13>
- Dzin, N. H. M., & Lay, Y. F. (2021). Validity and Reliability of Adapted Self-Efficacy Scales in Malaysian Context Using PLS-SEM Approach. *Education Sciences*, 11. <https://doi.org/10.3390/educsci11110676>
- Fernanda, J., Widyantari, I. N., & Fachrizal, R. (2024). Analisis Kelayakan Usaha Jasa Pelayanan Traktor Roda Empat Kubota Model L3608 dan Model L4018 di Distrik Tanah Miring Kabupaten Merauke Feasibility Analysis of Kubota Four-Wheel Tractor Service Service Business Model L3608 And Model L4018 In Tanah Miring. *Journal of Global Sustainable Agriculture*, 5(1), 1–5. <https://ojs.um-palembang.ac.id/index.php/JGSA/article/view/329>
- Ghosh, S., Datta, K., & Datta, S. K. (2018). Rice vitamins. In *Rice: Chemistry and Technology*. AACCI. Published by Elsevier Inc. in cooperation with AACC International. <https://doi.org/10.1016/B978-0-12-811508-4.00007-1>
- Hernawan, E., & Meylani, V. (2016). Analisis Karakteristik Fisikokimia Beras Putih, Beras Merah, dan Beras Hitam (*Oryza Sativa L.*, *Oryza Nivara* dan *Oryza Sativa L. indica*). *Jurnal Kesehatan Bakti Tunas Husada*, 15(1), 79. <https://doi.org/10.36465/jkbth.v15i1.154>
- Hussain, S., Fangwei, Z., Siddiqi, A. F., Ali, Z., & Shabbir, M. S. (2018). Structural Equation Model for evaluating factors affecting quality of social infrastructure projects. *Sustainability (Switzerland)*, 10(5), 1–25. <https://doi.org/10.3390/su10051415>
- Lanamana, W., & Fatima, I. (2022). A Comparison of Economic Efficiency Rate in the Jajar Legowo and Tegel Planting Systems: a Case of the Rice Farming in East Manggarai Regency, Indonesia. *Agrisocionomics*, 6(2), 299–312. <http://ejournal2.undip.ac.id/index.php/agrisocionomics>

- Machmuddin, N. (2016). *Analisis Efisiensi Ekonomi Usahatani Padi Organik dan Konvensional Nurlela Machmuddin*. Institut Pertanian Bogor.
- Mahananto, Sutrisno, S., & Ananda, C. (2009). Faktor- Faktor yang Mempengaruhi Produksi Padi Studi Kasus di Kecamatan Nogosari, Boyolali, Jawa Tengah. *Wacana*, 12(1), 179–191. <http://wacana.ub.ac.id/index.php/wacana/article/view/181>
- Marlina, M., Setyono, S., & Mulyaningsih, Y. (2017). Effect of Age of Seeds and Number of Seeds Per Point of Planting on The Growth and Production of Rice (*Oriza Sativa*) Ciherang. *Jurnal Pertanian*, 8(1), 26–36. <https://doi.org/10.30997/jp.v8i1.638>
- Mutiarasari, N. R. (2017). *Analisis Efisiensi Usahatani Bawang Merah di Kabupaten Majalengka, Jawa Barat*. Institut Pertanian Bogor.
- Nguyen, H. M., Demont, M., & Verbeke, W. (2021). Inclusiveness of Consumer Access to Food Safety: Evidence from Certified Rice in Vietnam. *Global Food Security*, 26(2), 1–9. <https://doi.org/10.1016/j.gfs.2021.100491>
- Nurhalizah, S., Kholijah, G., & Gusmanely, Z. (2024). Analisis Structural Equation Modeling Partial Least Square pada Kinerja Pegawai PT. Bank Pembangunan Daerah Jambi. *Indonesian Journal of Applied Statistics*, 6(2), 125. <https://doi.org/10.13057/ijas.v6i2.78921>
- Palobo, F. (2019). Analisis Kelayakan Usahatani Jagung Hibrida Pada Lahan Kering Di Merauke, Papua. *SEPA: Jurnal Sosial Ekonomi Pertanian Dan Agribisnis*, 16(1), 1. <https://doi.org/10.20961/sepa.v16i1.30112>
- Rahayu, S. E., & Febriaty, H. (2019). Analisis Perkembangan Produksi Beras Dan Impor Beras Di Indonesia. *Prosiding Seminar Nasional Kewirausahaan*, 1(1), 219–226. <https://doi.org/10.30596/snk.v1i1.3613>
- Randika, R., Sidik, M., & Peroza, Y. (2021). Analisis Faktor-Faktor yang Mempengaruhi Produksi Padi Sawah di Desa Sepang Kecamatan Pampangan Kabupaten Oki. *Societa: Jurnal Ilmu-Ilmu Agribisnis*, 10(2), 66–71. <https://doi.org/10.32502/jsct.v10i2.4292>
- Ratriyanto, A., Widyawati, S. D., P.S. Suprayogi, W., Prastowo, S., & Widyas, N. (2019). Pembuatan Pupuk Organik dari Kotoran Ternak untuk Meningkatkan Produksi Pertanian. *SEMAR (Jurnal Ilmu Pengetahuan, Teknologi, Dan Seni Bagi Masyarakat)*, 8(1), 9–13. <https://doi.org/10.20961/semar.v8i1.40204>
- Shafie, S. M., Masjuki, H. H., & Mahlia, T. M. I. (2014). Rice Straw Supply Chain for Electricity Generation in Malaysia : Economical and Environmental Assessment. *Applied Energy*, 135, 299–308.
- Sihombing, P. R., & Arsani, A. M. (2022). *Buku Aplikasi Minitab Untuk Statistisi Pemula* (A. Rasyid (ed.); Pertama, Issue March). PT Dewangga Energi Internasional. www.keira.id
- Silitonga, P. Y. (2017). *Pengaruh Pengelolaan Tanaman Terpadu Terhadap Efisiensi Produksi Dan Ketahanan Pangan Petani di Sentra Produksi Jagung Provinsi Jawa Barat*. Institut Pertanian Bogor. Bogor.
- Sriatmoko, T. P., Hidayat, N., & Sutrisno. (2019). Penentuan Varietas Padi Unggul Yang Akan Ditanam Berdasarkan Potensi Hasil Menggunakan Metode Analytic Hierarchy Process-Weighted Product. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, 3(3), 2837–2844. <file:///C:/Users/MASTER/Downloads/4826-1-33546-1-10-20190111.pdf>
- Sutarman, Ginting, N. M., & Widyantari, I. N. (2024). Komparasi Kelayakan Usahatani Padi Sistem Tanam Pindah Dan Sistem Tanam Benih Langsung di Kampung Yaba Maru Distrik Tanah Miring Kabupaten Merauke , Propinsi Papua Selatan Comparative Feasibility of Shifting Cultivation and Direct Seed System Rice Farming. *Journal of Global Sustainable Agriculture*, 4(2), 131–135.
- Syah, M. I., Widyantari, I. N., & Ginting, N. M. (2024). Kelayakan Usahatani Penangkar Benih Padi. *AgribiSains*, 10(1), 84–91. <https://ojs.unida.ac.id/AGB/article/view/12390/5074>
- Syaputri, F. D., Azwardi, & Sukanto. (2024). Determinants of The Level of Farmer Welfare in Identification Of Key Factors For Boosting To Increase Rice Production: Case Study In Merauke Regency, South Papua Province, Indonesia (Widyantari, et al., 2025)

- Indonesia. *Agrisocionomics*, 8(3), 954–967.
<https://ejournal2.undip.ac.id/index.php/agrisocionomics/article/view/22846>
- Van Nguyen, N., & Ferrero, A. (2006). Meeting The Challenges of Global Rice Production. *Paddy and Water Environment*, 4(1), 1–9. <https://doi.org/10.1007/s10333-005-0031-5>
- Widyantari, I. N., Jamhari, J., Waluyati, L. R., & Mulyo, J. H. (2023). The Performance of Marketing and Distribution on Rice Supply Chain in Merauke Regency, Papua, Indonesia. *Economia*, 19(2), 255–269.
- Widyantari, I. N., Jamhari, Waluyati, L. R., & Mulyo, J. H. (2018). Does the tribe affect technical efficiency? Case study of local farmer rice farming in Merauke regency, Papua, Indonesia. *International Journal of Mechanical Engineering and Technology*, 9(11), 37–47.
- Widyantari, I. N., Jamhari, Waluyati, L. R., & Mulyo, J. H. (2019). Case Study Of Farming From Transmigrants And Local Farmers In The District Of Semangga And Tanah Miring , Merauke Regency , Papua. *International Journal Of Civil Engineering And Technology (IJCIET)*, 10(02), 761–772.
http://www.iaeme.com/MasterAdmin/Journal_uploads/IJCIET/VOLUME_10_ISSUE_2/IJCIE T_10_02_073.pdf
- Widyantari, I. N., Jamhari, Waluyati, L. R., & Mulyo, J. H. (2020). Data Envelopment Analysis for Measurement the Performance of Rice Millings in Merauke Regency , Papua , Indonesia. *EurAsian Journal of BioSciences*, 14(2), 6261–6265.
- Widyantari, I. N., Loppies, S. H., Maulany, G. J., & Wiranto, R. (2023). The Use of The Stochastic Frontier Method for Measuring The Performance of Rice Farming in The Frontier, Remote, and Underdeveloped Areas in Merauke Regency, South Papua Province, Indonesia. *AGRIC*, 35(2), 181–192.
- Widyantari, I. N., & Maulany, G. J. (2020). The Location Quotient Approach for Determination of Superior Food Crop Commodity in Merauke Regency , Province of Papua , Indonesia. *EurAsian Journal of BioSciences*, 14(2), 7111–7117. <http://www.ejobios.org/article/the-location-quotient-approach-for-determination-of-superior-food-crop-commodity-in-merauke-regency-8478>
- Widyantari, I. N., Maulany, G. J., & Wijayanti, N. (2022). Analisis Kelayakan Usahatani Padi Petani Transmigran Di Kampung Margamulya Distrik Semangga Kabupaten Merauke Propinsi Papua. *SEPA: Jurnal Sosial Ekonomi Pertanian Dan Agribisnis*, 18(2), 207–213. <https://doi.org/10.20961/sepa.v18i2.50484>
- Widyantari, I. N., Maulany, G. J., Wijayanti, N., Agribisnis, J., Pertanian, F., Merauke, U. M., Informasi, J. S., Teknik, F., Merauke, U. M., Agribisnis, J., Pertanian, F., Samawa, U., & Iwes, U. (2022). Analisis kelayakan usahatani padi petani transmigran di kampung margamulya distrik semangga kabupaten merauke propinsi papua. 18(2), 207–213.
- Zaeroni, R., & Rustariyuni, S. D. (2016). Pengaruh Produksi Beras, Konsumsi Beras dan Cadangan Devisa Terhadap Impor Beras di Indonesia. *E-Jurnal Ekonomi Pembangunan Universitas Udayana*, 5(9), 993–1010. <https://ejournal.unsrat.ac.id/index.php/ebiomedik/article/view/11050/10639>
- Zhang, Z., Gao, S., & Chu, C. (2020). Improvement of Nutrient Use Efficiency in Rice: Current Toolbox and Future Perspectives. *Theoretical and Applied Genetics*, 133(5), 1365–1384. <https://doi.org/10.1007/s00122-019-03527-6>