WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Rice Productivity and Its Determinants in Regional Policy Perspectives: A Quantitative Study of Three Regencies in West Java, Indonesia

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ABSTRACT:

Rice productivity is an important indicator in achieving national food security. West Java Province as one of the national rice barns shows significant variations in productivity between districts. This study aims to analyze the factors that affect rice productivity in three districts, namely Bekasi, Sukabumi, and Tasikmalaya Regencies. This study uses a quantitative approach with descriptive and inferential designs. Data were collected through a survey of 141 farmers who were selected using a stratified random sampling technique, then analyzed using descriptive statistics, ANOVA test, Kruskal-Wallis test, and multiple linear regression. The results of the study show that there are significant differences in rice productivity between districts. Bekasi Regency has the highest productivity, followed by Sukabumi and Tasikmalaya. Variables that have a significant effect on rice productivity include land area, seed prices, fertilizer prices, tractor rentals, drug prices, and labor wages. Meanwhile, social variables such as age, education, training, and farming experience did not show a significant influence. Regression analysis per district revealed that the determinants of productivity are contextual and differ between regions. This study emphasizes the importance of *a place-based agricultural policy approach* in increasing rice productivity. Agricultural program interventions need to be adjusted to local characteristics both in terms of production capacity and the economic structure of farmers.

Keywords: rice productivity, linear regression, agricultural inputs, regional analysis, West Java

Introduction:

Rice (*Oryza sativa*) is the main commodity in Indonesia's national food system because it is a staple food source for the majority of the population. National food security is highly determined by the stability and increase of rice production, both in terms of harvest area and productivity per hectare. West Java as one of the largest rice-producing provinces contributes significant production every year. However, the achievement of productivity in this region still faces various challenges, especially inequality between regions which shows structural problems in the rice production system (BPS West Java, 2023).

A number of studies show that rice productivity is greatly influenced by the interaction between natural and socio-economic factors. Internal factors such as the level of education, farming experience, and training followed, are often associated with the capacity to adopt technology and manage production inputs (Kinanti, 2024). Meanwhile, external factors such as the availability of superior seeds, fertilizers, land rents, labor, and access to agricultural mechanization also play an important role (Ardyaningtyas, 2025; Indrianti et al., 2024). The combinatorial influence of the two groups of factors creates variations in productivity between regions that require data-driven understanding.

The West Java region has quite complex agroecological and socio-cultural diversity. Sukabumi and Tasikmalaya districts generally represent semi-traditional agricultural areas that still rely on conventional planting patterns and simple irrigation systems. In contrast, Bekasi Regency has undergone a transition towards the intensification and mechanization of agriculture due to its proximity to urban areas and better access to infrastructure. These three districts are a representation of the spectrum of conditions of rice farmers in West Java, so it is interesting to be studied in a comparative analysis framework.

Although previous studies have examined factors that affect rice productivity, cross-regional comparative studies with quantitative and multivariate approaches such as per-district regression are still limited. Some studies are more local or generalist without considering the diversity of the geographical and social contexts of farmers (Pratiwi, 2024). Therefore, this research offers novelty in the analytical approach as well as the relevance of policy, by emphasizing the importance of place-based policy design according to regional characteristics.

This research is not only academically important to strengthen the empirical basis in the study of agricultural productivity, but it is also practically relevant in assisting in the formulation of regional agricultural policies. By detecting key variables that affect productivity at the farmer level specifically in three districts, this research can be the basis for developing a more effective and targeted rice production improvement program. This area-based approach is

also important in the context of decentralization of agricultural development which requires local governments to be more responsive to the needs of local farmers.

Based on this background, this research was conducted with the aim to:

1. Describe the characteristics of farmers and farming inputs in the three districts.
2. Analyze differences in productivity and inputs of farming between regions.
3. Identify factors that have a significant effect on rice productivity in general and per district.

It is hoped that the results of this research can contribute to the formulation of policies to increase rice productivity based on the region, as well as become a reference in the implementation of extension programs, input assistance, and the development of agricultural technology that is more adaptive to the local context.

Methodology:

Object and Place of Study:

The object of this study is the productivity of rice farming and the factors that affect it, both from the socio-demographic and technical-economic aspects of farmers. This research was conducted in three districts in West Java Province that have different agroecological and social characteristics, namely Sukabumi Regency, Tasikmalaya Regency, and Bekasi Regency. These three regions represent regions with a diversity of agricultural intensification, ranging from traditional to modern.

Research Type:

This type of research is quantitative with a descriptive and inferential approach. The descriptive approach was used to describe the characteristics of respondents and the conditions of rice farming, while the inferential approach was used to analyze the influence of various independent variables on the productivity of rice crops. The analysis was carried out based on primary data obtained from the results of direct surveys of farmers.

Research Variables:

In this study, the variables used are classified as follows:

1. Dependent (bound) variables:
    1. Rice crop productivity (tons/hectare)
2. Independent (free) variables:
    1. Farmer's age (years)
    2. Formal education level (1. Not finishing elementary school; 2. Elementary School; 3. Junior High School; 4. High School; 5. Bachelor)
    3. Number of rice cultivation training attended (times/year)
    4. Farming experience (years)
    5. Land area under management (ha)
    6. Land rental price (IDR/season)
    7. Source seed price (IDR/season)
    8. Tractor rental price (IDR/ha)
    9. Fertilizer price (IDR/season)
    10. Agricultural Medicine Price (IDR/season)
    11. Labor wages (IDR/season)

Population and Sample:

The population in this study is all rice farmers spread across the West Java Province area. Sampling was carried out using the multistage stratified random sampling technique. The sample collection process is carried out in stages by considering the level of regional representation and social structure of farmers, as follows:

1. First strata (province to district): From all districts/cities in West Java, three districts were selected in stratification based on differences in agroecological characteristics and the level of agricultural intensification, namely Bekasi Regency (intensive-modern), Sukabumi (semi-traditional), and Tasikmalaya (traditional).
2. Second strata (district to district): From each selected district, one sub-district is randomly determined that has a high area and rice farming activity.
3. Third strata (sub-district to village): In each selected sub-district, three villages were randomly selected that were active in rice farming activities.
4. Fourth strata (village to farmer): In each selected village, the respondent farmers were randomly selected from members of the farmer group (Poktan) or a combination of farmer groups (Gapoktan) who were active, assuming that the members of this group had direct involvement in rice production activities.

This process resulted in a total sample of 141 farmers, with the distribution as follows:

1. Bekasi Regency: 47 respondents
2. Sukabumi Regency: 44 respondents
3. Tasikmalaya Regency: 50 respondents

This sampling structure is expected to be able to represent the diversity of social and technical conditions of rice farmers in West Java, as well as provide an accurate empirical picture in analyzing the determinants of rice productivity between regions.

Data Analysis Tools:

The data was analyzed using descriptive statistical analysis tools such as mean, standard deviation, and frequency distribution. Then the difference test between districts used ANOVA for the ratio variable and the Kruskal-Wallis test for the ordinal variable, as well as multiple linear regression analysis to test the influence of free variables on rice productivity using the help of SPSS software version 26.

Results

Description of Characteristics of Farmers and Inputs of Farming in Three Districts:

The following are the results of the analysis of the description of characteristics of farmers and inputs of farming in three districts.

Table 1 - Description of Characteristics of Farmers and Inputs of Farming in Three Districts.

Variabel		Count	Mean	Std	Difference Test by District		
					F-Statistik	p-value	Status
1.	Farmer's age (years)	141	48.28	8.12	0.064	0.937	No difference
2.	Formal education level (Ordinal)	141	2.76	0.98	1,788	0.409	No difference
3.	Number of rice cultivation training attended (times/year)	141	1.84	0.86	0.730	0.484	No difference
4.	Farming experience (years)	141	21.48	10.18	5.930	0.003	Significant differences
5.	Land area under management (ha)	141	0.88	0.59	100.78	0.000	Significant differences
6.	Land rental price (IDR/season)	141	4323514.89	3046650.97	103.68	0.000	Significant differences
7.	Source seed price (IDR/season)	141	281188.83	183443.77	124.40	0.000	Significant differences
8.	Tractor rental price (IDR/ha)	141	980003.55	647994.61	68.170	0.000	Significant differences
9.	Fertilizer price (IDR/season)	141	1402838.65	1384970.13	58.480	0.000	Significant differences
10.	Agricultural Medicine Price (IDR/season)	141	1521124.11	1673722.87	74.060	0.000	Significant differences
11.	Labor wages (IDR/season)	141	5518939.72	5754856.88	274.85	0.000	Significant differences

In terms of the socio-economic characteristics of farmers, it is known that the age of farmers is relatively uniform in the three regions, ranging from 47-49 years. Formal education is mostly at the elementary to high school levels. Only a small percentage of farmers in Tasikmalaya have studied up to

university. However, this level of education does not show significant differences between districts (p = 0.409), and tends not to have a strong correlation with productivity as also reported by Kinanti (2024), who states that formal education is not necessarily directly proportional to the application of technical innovations in rice farming.

The formal education level of rice farmers shows that most of the respondents have a primary to secondary education background. Farmers with elementary and junior high school education are the largest group, while the proportion of farmers who achieve undergraduate education is relatively small. This reflects the general profile of farmers in rural West Java which is still dominated by workers with low to moderate education. The results of the Kruskall-Wallis test with p = 0.409 showed that there was no difference in formal education levels in the three districts. According to Rasmikayati and Suminartika (2025), farmers' education levels are a differentiating factor in the way they access and adopt agricultural information, although their influence on productivity is not always immediately significant.

The average number of trainings attended is in the range of 1-2 times per year, with the highest score in Sukabumi. However, the difference test showed that the frequency of this training did not differ significantly between regions (p = 0.48). This indicates that access to training has not yet become a real differentiator in cultivation capacity.

The farming experience variable showed more varied results. Farmers in Sukabumi have a longer average experience (21.5 years), while in Tasikmalaya they tend to be shorter. The ANOVA test stated that this experience differed significantly between districts (p = 0.003). This is in line with research by Indrianti et al. (2024), which asserts that long experience can support technical efficiency, but is only effective when accompanied by innovation.

In terms of production inputs, the most striking differences are found in the variables of land area, seed prices, tractor rental prices, fertilizer prices, drug prices, and labor wages. All of these variables showed very significant differences between districts (p < 0.001). Farmers in Bekasi have a larger land area and higher cost allocation, reflecting a more modern and intensive farming pattern. This is in line with the findings of Ardyaningtyas (2025), which shows that areas with technical irrigation support and access to mechanization tend to have higher productivity.

In contrast, farmers in Tasikmalaya manage land at a much lower input cost. This indicates limited purchasing power of farmers or access to production facilities, which then has an impact on low productivity. In this context, the results of a study by Firmansyah and Waridin (2025) become relevant, where the motivation and ability of young farmers to engage in modern agriculture are greatly influenced by capital factors and agricultural infrastructure.

Results of the analysis of the difference in productivity between districts:

The following are the results of the Description and analysis of the difference in productivity in three districts.

Table 2 - Description and Analysis of The Difference in Productivity Between Districts.

Regency	Average (tons/ha)	Standard Deviation (tons/ha)	F-statistic	p-value
Bekasi	8.98	5.41		
Sukabumi	5.80	2.26	49.19632	0.000
Tasikmalaya	2.01	1.36		

The results of the descriptive analysis showed that there was a quite striking difference in the average rice productivity between districts. Bekasi Regency has the highest average productivity of 8.98 tons/ha with a standard deviation of 5.41, which shows a fairly high variation between farmers. Meanwhile, Sukabumi Regency has an average productivity of 5.80 tons/ha with a standard deviation of 2.26, and Tasikmalaya Regency shows the lowest productivity of 2.01 tons/ha with a standard deviation of 1.36.

Statistical tests using one-way ANOVA yielded a value of F = 23.88 and a p-value of < 0.001, which means that there was a statistically significant difference at the level of 1% significance between the three districts. Thus, it can be concluded that the location or area of the district contributes significantly to the variation in the productivity of rice farmers. Substantively, this shows that farmers in Bekasi Regency have higher and more efficient access to and utilization of production inputs, possibly influenced by the quality of infrastructure, the intensity of technology use, or institutional support. On the other hand, low productivity in Tasikmalaya indicates the need to increase access to production facilities and more effective agricultural extension. These results are in line with the findings of Putra (2023) and Indrianti et al. (2024), who stated that geographical variation and availability of means of production play an important role in determining the level of agricultural output.

Linear Regression Test Results: Factors Affecting Rice Productivity:

The results of multiple linear regression analysis showed that the model had a determination coefficient (R^2) of 0.888, which means that the model was able to explain 88.8% of the variation in rice productivity, a very high value for field survey data.

Table 3 - Regression Results of Free Variables Affecting Rice Yield Productivity.

Variables	Coeficient	Standard Error	t-Statistic	p-Value	Significance
Intercept	-13.685	1.223	-1.119	0.265	Not significant
Farmer's age (years)	-0.0019	0.024	-0.077	0.938	Not significant
Formal education level (Ordinal)	0.0545	0.159	0.343	0.732	Not significant
Number of rice cultivation training attended (times/year)	0.2480	0.173	1.431	0.155	Not significant
Farming experience (years)	0.0323	0.020	1.649	0.102	Not significant
Land area under management (ha)	49.699	1.560	3.186	0.002	Significant
Land rental price (IDR/season)	0,000	0,000	-0.233	0.816	Not significant
Source seed price (IDR/season)	-0,009	0,000	-2.569	0.011	Significant
Tractor rental price (IDR/ha)	0,002	0,000	3.251	0.000	Significant
Fertilizer price (IDR/season)	0,002	0,000	7.265	0.000	Significant
Agricultural Medicine Price (IDR/season)	-0,001	0,000	-4.058	0.000	Significant
Labor wages (IDR/season)	0,000	0,000	3.470	0.001	Significant

Of the eleven independent variables tested, six showed a statistically significant influence ($p < 0.05$) on productivity, namely:

1. Farmland area ($p = 0.002$): strong positive effect. The more land managed by farmers, the productivity per hectare tends to increase. These findings support the results of Ardyaningtyas' (2025) research which states that economies of scale provide efficiency advantages in intensive agricultural systems.
2. Seed price ($p = 0.011$): negative effect on productivity. This may be due to the use of seeds at a high price but quality or match that is not commensurate with local agroecological conditions (Pratiwi, 2024).
3. Tractor rental price ($p = 0.001$): positive effect. The availability and use of tractors are indicators of mechanization that support increased yields.
4. Fertilizer price ($p < 0.001$): has a strong positive influence. The greater the expenditure on fertilizer, the higher the productivity produced, as also stated by Kinanti (2024).
5. The price of agricultural medicines ($p < 0.001$): actually shows a negative influence. Excessive or improper use of pesticides can adversely affect crop yields.
6. Labor wages ($p = 0.001$): had a significant positive effect. Sufficient and qualified labor supports efficiency in processing and harvesting.

Meanwhile, the other five variables, namely the farmer's age, level of formal education, frequency of training, farming experience, and land rental price, did not have a significant effect on productivity. This is in line with the findings of Kinanti (2024) and Indrianti et al. (2024) which state that farmers' socio-demographic factors tend to have an indirect role in productivity unless supported by technology adoption capacity.

In general, these results show that technical inputs and production economic capacity are the main determinants in rice productivity. Social factors such as age and education are more supportive, not direct determinants. The implications of these results lead to the importance of increasing farmers' access to quality production facilities, including agricultural modernization through mechanization, fertilizer subsidies, and counseling focused on the effectiveness of input use.

Results of Regression Analysis Based on per District:

To identify the consistency of influence patterns between regions, regression analysis was carried out separately in three districts: Sukabumi, Tasikmalaya, and Bekasi. This approach aims to see whether the factors that affect rice productivity have a uniform pattern or vary contextually.

1. Sukabumi Regency

The regression model in Sukabumi Regency showed an R^2 of 0.851, which means that most of the variation in productivity can be explained by the variables tested. The variables that had a significant influence were land area ($p < 0.01$), fertilizer price ($p < 0.001$), and labor wages ($p < 0.05$).

Other variables, such as education, training, and the age of farmers, did not show significant influences. This pattern shows that Sukabumi farmers tend to rely on labor-based intensification and chemical inputs as a strategy to increase yields. This finding is in accordance with Kinanti (2024) who states that semi-traditional areas such as Sukabumi are highly dependent on physical and chemical support in agricultural productivity.

2. Tasikmalaya Regency

The regression model in Tasikmalaya yielded a lower R^2, which was 0.612. Only a few variables have a significant influence, one of which is the price of fertilizer. Land area and labor wages do not show statistical significance.

This condition shows that rice productivity in Tasikmalaya is greatly influenced by non-economic factors that are not recorded in the regression model, such as topographic conditions, irrigation access, or capital availability. This also reflects the findings from Pratiwi (2024) that areas with limited agricultural infrastructure face structural obstacles in increasing productivity.

3. Kabupaten Bekasi

Bekasi district showed the strongest results with an R^2 of 0.934, indicating that 93.4% of the variation in productivity was explained by the model. Almost all economic variables such as fertilizer prices, seed prices, tractor rentals, drug prices, and labor wages have a significant influence on productivity. Bekasi as an area with good access to agricultural infrastructure and a high level of modernization shows that mechanization and quality production inputs are the key to high productivity. This supports the research results of Ardyaningtyas (2025) and Firmansyah & Waridin (2025), which emphasize the importance of investing in modern agricultural systems in urban and peri-urban areas.

Differences between districts show that one model of agricultural intervention cannot be applied uniformly. Productivity improvement strategies should be tailored to local socio-economic conditions, availability and quality of agricultural infrastructure, and technology adoption capacity by farmers. Therefore, data-based and contextual agricultural policies are needed in order to bridge the productivity gap between regions in West Java.

The results of this study show that the variables of farming experience and participation in training have a significant influence on rice productivity. These findings support the results of previous research that emphasized the importance of increasing the capacity and literacy of farmers in encouraging farming efficiency. Social capital and farmer control behavior reflected in the participation of farmer groups are also important elements in supporting the success of cultivation (Rasmikayati & Suminartika, 2025).

Furthermore, a strong pattern of cooperation and coordination between farmers has been proven to have an impact on productivity achievement, especially in the context of collective input management and resource use efficiency. The study by Rasmikayati and Suminartika (2025) which compared rice farmers in Ciracap and Rancaekek emphasized that the coordination system in farmer groups contributes to production stability and the effectiveness of agricultural information distribution.

In addition, the importance of social and institutional interaction of farmers in increasing rice productivity is in line with the results of this study, especially in the context of Sukabumi and Bekasi Regencies which show a tendency to succeed in areas with active and participatory farmer group organizations. This is in line with the idea that the success of small-scale farming systems depends heavily on social connections and access to structured collective knowledge.

Conclusion

Based on the results of this study, there are several conclusions:

1. The characteristics of farmers and farming inputs in the three districts were relatively uniform but there were significant differences in farming input capacity, with Bekasi Regency showing the highest intensification and Tasikmalaya the lowest. The average age of farmers ranges from 47–49 years old and the level of education is dominated by elementary to high school graduates. Farming experience and frequency of cultivation training also did not show a marked variation, but significant differences were found in the aspect of farming inputs
2. Rice productivity varies significantly between districts, with Bekasi showing the highest average (8.98 tons/ha), followed by Sukabumi (5.80 tons/ha), and Tasikmalaya as the lowest (2.01 tons/ha). This difference is statistically significant and reflects inequalities in access to production inputs, economic capacity, and agricultural infrastructure.
3. Economic and technical factors have a significant influence on rice productivity. Among them are land area, seed prices, tractor rentals, fertilizer prices, drug prices, and labor wages. In contrast, socio-demographic characteristics such as age, education, and training did not show a statistically significant influence. Regression analysis per district revealed local variations in productivity determinants. Bekasi, as a region with a modern agricultural system, shows a strong influence of production input variables. Sukabumi tends to rely on labor and fertilizer inputs, while Tasikmalaya faces limitations in many aspects that hinder overall productivity. These findings indicate the need for a region-based productivity improvement policy, taking into account the specific conditions of each district. The "one policy for all" approach is not effective in the context of rice farming in West Java. Thus, it can be concluded that increasing rice productivity does not only depend on individual efforts of farmers, but also on systemic support in the form of access to means of production, mechanization, and public policies that are adaptive to local needs.

References:

1. Ardyaningtyas, A. B. (2025). Faktor-faktor yang mempengaruhi Produktivitas Padi menggunakan Metode Geographically And Temporally Weighted Regression (GTWR). Universitas Islam Indonesia. https://dspace.uii.ac.id/handle/123456789/55861

2. BPS Jawa Barat. (2023). Produksi Padi Jawa Barat Tahun 2022–2023. Badan Pusat Statistik Provinsi Jawa Barat. https://jabar.bps.go.id

3. Firmansyah, P. D., & Waridin, W. (2025). Motivasi Pemuda dalam Bekerja di Usaha Pertanian Padi di Kecamatan Dempet Kabupaten Demak. Universitas Diponegoro. https://repofeb.undip.ac.id/16458/

4. Indrianti, M. A., Gobel, Y. A., Hasan, D., & Djaini, A. (2024). Analisis Produksi Padi di Kecamatan Limboto Kabupaten Gorontalo. Jurnal Agriovet, 6(1), 23–30. https://ejournal.kahuripan.ac.id/index.php/agriovet/article/view/1312

5. Kinanti, S. A. (2024). Faktor-Faktor Ekonomi yang Mempengaruhi Produktivitas Padi di Jawa Barat Periode 2018–2019. ResearchGate. https://www.researchgate.net/publication/389720745

6. Pratiwi, D. S. (2024). Analisis Faktor-Faktor yang Mempengaruhi Produksi Padi Sawah di Kecamatan Hinai Kabupaten Langkat. Universitas Malikussaleh. https://rama.unimal.ac.id/id/eprint/9291/

7. Putra, A. (2023). Analisis Faktor yang Mempengaruhi Produksi Padi pada Empat Provinsi di Indonesia. Universitas Andalas. https://scholar.unand.ac.id/158282/

8. Rasmikayati, E., & Suminartika, E. (2025). Komparasi Modal Sosial Perilaku Kontrol dan Norma Petani pada Dua Sentra Produksi Padi. Jurnal Ilmiah Mahasiswa Agroinfo Galuh. https://jurnal.unigal.ac.id/index.php/agroinfogaluh/article/view/17579

9. Rasmikayati, E., & Suminartika, E. (2025). Analisis Komparatif Pola Kerjasama dan Koordinasi Petani Padi di Ciracap dan Rancaekek. Mimbar Agribisnis. https://jurnal.unigal.ac.id/mimbaragribisnis/article/view/17514

10. Sartikasari, D. (2024). Analisis Faktor-Faktor yang Mempengaruhi Produksi Padi di Pulau Jawa. Universitas Jember. https://repository.unej.ac.id/handle/123456789/131247